Report No: 2013R079

Historic Seascape Characterisation South West Peninsula

Section 3
Character Type Text Descriptions

Historic Environment Projects

one and all onen hag oll
CORNWALL COUNCIL

ENGLISH HERITAGE

Historic Seascape Characterisation South West Peninsula

Section 3
Character Type Text Descriptions

Client	**English Heritage**
Report Number	**2013R079**
Date	**30/01/2014**
Status	**Final**
Report author(s)	**Peter Dudley and Charles Johns**
Checked by	**Charles Johns**
Approved by	**English Heritage**

Report Structure

The Project Report for 'Historic Seascape Characterisation: South West Peninsula' is divided into three sections for ease of use. The first section outlines the project's method implementation, the second section outlines an applications review and case studies, and the third section contains printed versions of the Character Type text descriptions from national and regional perspectives.

This document comprises Section 3 of the 'Historic Seascape Characterisation: South West Peninsula' Report: the national and regional perspective Character Type texts.

Historic Environment, Cornwall Council

Fal Building, New County Hall, Treyew Road, Truro, Cornwall, TR1 3AY

tel (01872) 323603 fax (01872) 323811 E-mail hes@cornwall.gov.uk

www.cornwall.gov.uk

Acknowledgements

This study was commissioned by English Heritage and carried out by Historic Environment Projects, Cornwall Council. The English Heritage Project Assurance officer was Dave Hooley.

The Project Manager was Charles Johns and the Project Officers were Peter Dudley and Megan Val Baker. In the early stages of the project the HSC Advisor was Bryn Tapper.

The views and recommendations expressed in this report are those of Historic Environment Projects and are presented in good faith on the basis of professional judgement and on information currently available.

Freedom of Information Act

As Cornwall Council is a public authority it is subject to the terms of the Freedom of Information Act 2000, which came into effect from 1st January 2005.

Historic Environment, Cornwall Council is a Registered Organisation with the Institute for Archaeologists

Cover illustration

Fossil collectors on Charmouth Beach, Dorset. (Photograph: Dave Hooley.)

Contents

List of Figures

1 CHARACTER TYPE TEXT DESCRIPTIONS

1.1 National Perspective

The following National Perspective HSC Character Type texts are amended versions of those prepared in February 2011 for the Bristol-Severn project area.

1.1.1 Broad Character: Navigation

1.1.1.1 Character Type: Navigation Features

Introduction: defining/distinguishing attributes

This Character Type includes the following Sub-types:

- Navigation channel (active);
- Navigation channel (disused);
- Navigation channel (disused buried);
- Dredged channel/area.

This Character Type relates to areas created for, and directly relating to, the passage of shipping traffic. This Character Type is found where active management has been undertaken to maintain the accessibility of a stretch of water for safe passage. In relating to active management of material portions of navigation route across hazardous areas, this Type is distinct from the 'Navigation Activity' Character Type which is defined by usage and/or regulation.

Expressions of this Character Type include active, disused and buried navigation channels, dredged channels and entrances to harbours. Increased sea trade, particularly from the 19th century onwards, saw larger vessels in greater numbers seeking access to what had long been hazardous and restricted river or estuary channels. Industrialisation forced port authorities to improve and maintain navigational access by dredging, the spoil often dumped out to sea. Creating estuary channels also often involved the reclamation of adjacent land, including sand banks and saltmarsh, and the construction of retaining walls.

'Navigation channel (active)' includes channels charted or otherwise recorded as in active navigational use by present shipping traffic, whether or not the channel is of historic or modern origin. Time-depth expressed in the HSC attributes will reveal the channel's broad date of origin.

'Navigation channel (disused)' includes historic channels no longer charted or recorded as in active navigational use for present shipping traffic, whatever the channel's date of origin. Again, time-depth expressed in the HSC attributes will reveal the channel's broad date of origin and that it is no longer in use in the present. Where there is evidence that the channel is also now a buried feature (if extant at all), it will be assigned to 'Navigation channel (disused buried)'.

'Navigation channel (disused buried)' includes historic channels no longer charted or recorded as in active navigational use for present shipping traffic, and with evidence that the channel is also now a buried feature (if extant at all). As above, time-depth expressed in the HSC attributes will reveal the channel's broad date of origin.

'Dredged channel/area' refers to the removal of accumulated sediments from harbour channels and berths to ensure a safe depth of water for navigational purposes, or similar maintenance works to remove sediment to restore an adequate flow of water to mitigate risk of flooding or protect a sensitive habitat. Maintenance dredging refers to the excavations of material to deepen or create navigational channels and berths to provide additional harbour infrastructure or provide access for deeper draught vessels. The difference between capital and maintenance dredging is that capital dredging

reduces the seabed to a level (relative to Ordnance Datum) lower that it has been at anytime during the preceding 10 years.

English waters have been used for navigation since prehistoric times and such activity contributes considerably to the character of the marine landscape/seascape. Despite in themselves leaving no permanent mark on the sea surface, they have a diversity of associated features on and offshore and are responsible for the thousands of wrecks and related materials and debris surviving on the seabed across the UK Controlled Waters.

Navigational channels are found in many areas of English waters. Several navigational channels, especially those that are prone to silting, are dredged or cleared of sediment frequently enough to ensure enough draught for safe harbour (e.g. within the Thames and Mersey Estuaries).

Historical processes; components, features and variability

Usual components of this Character Type include active, disused and disused buried navigation channels, dredged channels and entrances to harbours.

Navigable channels have been used since prehistoric times (Cunliffe 2001) but the extent to which they were or could be maintained is unclear. On the Irish Sea, travel was generally characterised by short-haul pottering between beaches on rocky foreshores and islands, and there were (and still are) numerous inshore lakes and narrow necks of land inviting portages. Navigational channels can be constrained by the presence of hazards such as sandbanks and are now often buoyed to avoid these features. Our knowledge of navigation features offshore mainly dates back to the 1800s.The Hydrographic Office was established as a sub-department of the Admiralty in 1795 and issued its first officially published Admiralty chart in November 1800 (http://www.nationalarchives.gov.uk/records/research-guides/admiralty-charts.htm). These charts were continually updated and corrected to reduce the dangers from the changing position of channels.

Natural rivers and lakes were used as waterways for the transportation of people and goods. These were often then improved to make navigation more reliable and capable of taking ships of greater draught. Many rivers were dredged from the post medieval period onwards to allow transport to major trading ports and, later, industrial centres., Other modifications included the construction of artificial channels and flash locks (i.e. designed with a single gate). The introduction of the pound lock (a lock almost exclusively found nowadays on canals and rivers) enabled more ambitious waterways to be built.

Industrialisation from the mid 18th century required the transportation of large quantities of raw materials and finished goods. This led to the construction of a large network of canals in England, some of which connected directly with tidal zones via locks as, for example in the Copperhouse Canal built in 1769 at Hayle, Cornwall. The decline of many canals and, in some cases their abandonment, started with the competition first from railways and later from road transport.

Values and perceptions

Navigation channels and dredged areas form an integral part of working ports or harbours but most people are probably unaware of their vital role in maintaining that operation. More obvious are the dredging craft that are often found moored in harbours ready for service, becoming a regular part of the landscape/seascape of coastal communities. For mariners the importance of maintaining a safe draught for vessels is imperative to their livelihoods and safety.

Research, amenity and education

The history of creating and maintaining navigation channels is an important aspect of cultural manipulation of the coastal and marine environment to facilitate economic desires and expansion. Many navigable channels are now lost or buried. Where extant

but obscured, they may offer potential for the survival and understanding of closely associated features, such as wrecked craft, wharves, pilings, jetties, artefacts and palaeo-environmental components.

This Character Type provides an enormous public amenity for the commercial shipping and ports that depend on maintained navigational accessibility, but also on a far smaller scale, they enable safer access too for recreational watercraft, small boats and anglers to use these areas and reach their moorings.

The British Marine Aggregates Producers Association (BMAPA) and English Heritage have put in place a Protocol for Reporting Finds of Archaeological Interest (2006). Although generally understood to be relevant to aggregates dredging operations offshore, this protocol also applies to the wharves and vessels of all BMAPA companies and requires that any finds discovered at a wharf, onboard vessel or on the seabed are reported to allow such finds from our common submerged heritage to be better understood.

The educational potential of this Character Type is considerable. For example, the 'Solent Aggregates to Outreach' project has successfully demonstrated the direct educational potential of dredging related subjects and the historic environment (Hampshire & Wight Trust for Maritime Archaeology 2007; also see http://www.hwtma.org.uk/index.php?page=aggregate-to-outreach; http://ads.ahds.ac.uk/project/alsf/). Further educational tools could be developed to raise awareness in schools about these less visible aspects of our common cultural inheritance and demonstrating the beneficial collaboration between regulators, the heritage sector and industry, in this case the aggregates industry.

Condition and forces for change

Dredging has much affected the historic character of the waters in the United Kingdom, enabling many ports to develop much further and be accessed by far larger vessels than would otherwise be possible. It is a necessary requirement at the approaches to most active ports and will continue to be so.

In England, dumping of industrial waste at sea has been prohibited since 1994. The bulk of the material eligible for disposal at sea now comes from port and navigation channel operations, as well as coastal engineering projects. Nevertheless, dumping of dredged materials can introduce contaminants to the marine environment (Department of Trade and Industry 2002a, b).

Sandbanks also relate intimately with this Character Type as mobile entities prompting the need for active management to maintain navigation. Besides dredging to keep channels clear, sediment mobility through time can require that the course of channels close to major sandbanks need changing. Reduction in shipping activity and restructuring of navigation routes to serve new or expanded ports can also lead to former channels becoming redundant. This can result in the presence of disused or buried former navigation channels (e.g. in the approach to the Mersey River). The development of lighthouses along the coast can illustrate changing sandbanks and channels. For example a series of lighthouses were constructed in Harwich in the 19th century due to the changing course of the main channel into the port.

In general, the survival of river channels is fairly good even if most components are no longer used or have been developed by industry.

Rarity and vulnerability

This Character Type has a wide variety of well preserved components from the early modern period onwards. In areas that are continually dredged today, the potential of encountering prehistoric or historic remains could be considered low due to dredging having an intrusive impact on the seabed and river banks. However, in some places, there may be remnants of historic dredging activities.

Navigation channel dredging activities, if new or expanded from previous operations, may alter the historic character of a region although the major effects are more likely to arise from the stimulus for such change, such as port development or expansion.

Climate change may also affect some channel-dredging regimes as increased water turbulence and storm activity changes the environmental influences bearing on the position of sandbanks.

Published Sources

BMAPA, English Heritage, 2005. *Protocol for Reporting Finds of Archaeological Interest*, Prepared by Wessex Archaeology on behalf of BMAPA & English Heritage, http://archaeologydataservice.ac.uk/archives/view/bmapa_eh_2006/

Cunliffe, B, 2001. *Facing the Ocean, the Atlantic and Its People*, Oxford: Oxford University Printers

Department of Trade and Industry. 2002a. *Strategic Environmental Assessment of Mature Areas of the Offshore North Sea SEA2*. London: DTI

Department of Trade and Industry. 2002b. *Strategic Environmental Assessment of Parts of the Central & Southern North Sea SEA 3*, London: DTI

Hampshire & Wight Trust for Maritime Archaeology. 2007. *Aggregates to Outreach: Presentation and Teaching Pack Final Report*, Southampton: Hampshire & Wight Trust for Maritime Archaeology on behalf of English Heritage

Websites

http://www.mfa.gov.uk/

http://en.wikipedia.org/wiki/Portal:UK_Waterways

http://en.wikipedia.org/wiki/River_Tyne,_England

1.1.1.2 Character Type: Navigation Activity

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type includes the following Sub-types:

- Anchorage
- Ferry crossing
- Harbour pool
- Navigation route
- Quarantine area

This Character Type identifies areas characterised by human activity directly relating to the passage of shipping traffic, such as navigation routes, anchorages and ferry crossings, including intimately associated areas and features such as buoyage at anchorages, and ferry crossing terminals. Physical demarcation of such areas varies and may be only partial, if present at all: their definition may be largely or wholly by legal designation or custom and usage.

An ‘Anchorage’ refers to an area of sea or coast where ships, vessels and craft anchor, often provided by sheltered conditions afforded by the topography of the nearby coast. Anchorages are known and regularly re-used by vessels for safe anchoring and sheltering from bad weather; they are often located along coastlines within bays or areas sheltered from prevailing winds, strong currents and turbulent waters. They may have enhanced archaeological potential as their regular occupation increases the likelihood of finding vessels that had succumbed to bad weather and sunk despite seeking shelter, together with debris discarded or dropped from ships at anchor.

A 'Ferry crossing' is a regular commercial passenger route across an area of sea, estuary, river or lake, or an area of port, dock or harbour. It often includes associated embarkation and disembarkation areas, together with buildings for passengers and areas for vehicle waiting and customs control. Fixed chain-link ferry crossings are included here too.

'Harbour pool' relates to an area of water including and adjacent to a port or harbour, falling under the jurisdiction and hence, of relevance for characterisation, the activity-controls, of a port/harbour authority. Includes associated traffic-areas and areas of restricted navigation. Depending on the scale of HSC and the area occupied by such a 'pool', it may also be assessed for HSC as one component of an overall 'Harbour' in the 'Ports and Docks' Character Type.

A 'Navigation route' relates to routes regularly used by vessels of any description while navigating between destinations. May be defined by usage or in some areas, formally defined by regulation. Navigation routes are distinct from 'Navigation channels' which are actively managed physical features identifying or securing a navigation route across hazardous areas of sea-floor. They are also distinct from the more specific 'Commercial shipping routes' regularly used by merchant shipping and discussed in the text for the 'Shipping Industry'.

A 'Quarantine area' is an area often linked to a port or its marine approach, where a period of detention was imposed on travellers or voyagers suspected of carrying infectious diseases before they were allowed to enter a country or town. It includes anchorages and intimately-associated shore facilities such as quays and 'pest houses'. Quarantine is also the term for the period of time during which a ship, capable of carrying contagion, is kept isolated on its arrival at port.

English waters have been used for navigation since prehistoric times and such activity contributes considerably to the character of the marine landscape/seascape. Despite in themselves leaving no permanent mark on the sea surface, they have a diversity of associated features on and offshore and are responsible for the thousands of wrecks and related materials and debris surviving on the seabed across the UK Controlled Waters.

The distribution of wrecks is very dense off much of the English coast, especially in inshore waters which probably carried the bulk of historic coastal trading activity. The full extent to which the recorded resource reflects the actual surviving wreck resource will always remain uncertain, and the exact location of most known wrecks is not precisely known, with mapping only to the nearest kilometre grid square, or proximity to its known port. And of the known wreck sites, relatively few have had their original identity confirmed.

Historic anchorage areas occur in many places along the English coast. For example, there have been a number of stone anchor finds around the English coast especially off Dorset, providing some indications of earlier seafaring. Historic anchorage areas can usually be found in sheltered bays or in the lee of headlands. Mooring vessels and craft would have dropped anchor in these areas, potentially disturbing or revealing material remains in, on or under the seabed. Consequently, there is the potential for encountering associated artefacts and debris at these areas. Some anchorage areas are characterised by having been dredged or cleared of sediment to provide enough draught for safe anchoring. One legacy of anchorages is high levels of material remains on the seabed due to artefacts being either lost overboard or deliberately jettisoned. To date there have been few detailed studies of these sites so their full archaeological importance is not always recognised.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type mainly include: shipping routes; wrecks and associated materials; quays and docks; warehouses; landing points, and quarantine stations.

The sea and rivers provided the chief economical means of transporting large quantities of goods for any significant distance before the creation of an effective road and railway system. England's maritime trade and transport links with continental Europe are known to have developed during the prehistoric period. It is believed that log boats (canoes made from hollowed out tree trunks) and skin boats were common, and used during early times as ferries, fishing boats, trading or war vessels (Friel 2003, 22; McGrail 2001). The distribution of log boats has generally been confined to inland riverine contexts (Van de Noort 2003).

Vessels attributable to the Bronze Age, as from Ferriby and Brigg (both in the Humber region), and another found in Dover, were relatively substantial vessels (McGrail 2001, 184-190) which would have required a significant investment in people and resources to build and maintain them. The large size and robustness of these Bronze Age vessels could suggest that in some cases they could have been used for open sea voyages as far afield as the continent, in addition to a more local role on the estuaries where they were found (see Van de Noort 2003, 406).

From Roman contexts, navigational activity is exemplified by the 'County Hall' ship from London, dating to the 3rd century AD. Its typically Mediterranean construction contrasts with Romano-Celtic methods. However, dendrochronological research shows that the ship was built in Britain (Gibbins 1995). It also illustrates that the English society was built on maritime movements of goods, people and ideas, which are also expressed in imagery from coins, mosaics and sculptures of the time.

After apparent sharp decline in maritime trade during the early post-Roman period, commercial trading activity with continental Europe was stimulated again from the late 6th century, and the 8th and 9th centuries saw the greatest resurgence of European trade since the fall of the Roman Empire. Most of this trade relied on water transport and, as a consequence, urban settlements were revitalised along rivers and near to the coast, changing the character of the landscape/seascape (Clarke 1985).

Between the 8th and 11th centuries, Scandinavian influence spread widely across Europe and beyond, disrupting earlier trade patterns and patrons but creating new ones. This was achieved often through previously unparalleled feats of navigation and endurance, facilitated by their longship design: open, clinker-built vessels which could be propelled both by oars and sail. Modifications of the hull shape and the addition of a sail meant that by the 9th century the Viking ship was capable of sailing long distances on the high seas and was not limited to coasting (Binns 1985). This period of Scandinavian expansion and influence is known as the Viking Age, with huge social, political and economic impacts in England. The material role of their ships in their success was mirrored in their spiritual role in Viking mythology where they often figure as the final transport and resting place in heroes' funerary rites, a role finding expression in the occasional discoveries of Viking Age boat burials.

During the medieval period, trading networks expanded across Europe and trading confederations such as the Hanseatic League emerged. The English Channel became an important artery between Britain and the rest of the European continent, with Southampton, Bristol, London and the Cinque ports of Sandwich, Dover, Hythe, Romney and Hastings being favoured points of transit (Friel 2003, 70). There was also an increase in hostilities which, together with increased seaborne trade, had a large influence on the development of shipping (Friel 2003).

Piracy was endemic in medieval Europe. The divide between pirate and sea trader was often blurred: the people who committed piracy were commonly traders in their own right and usually the same people that governments relied on when waging naval warfare. A similarly blurred distinction was that between piracy and privateers, the latter being those licensed by a government to attack the ships of state enemies. In practice people moved fairly freely between these distinctions and in England, piracy was a civil and not a criminal offence until the 16th century (Friel 2003, 82-83).

The post medieval and early modern periods in England were a phase of transformation in industrial development, invention and new scientific discovery. Part of this included the expansion of navigation activities on a global scale, accompanied by a large movement of goods, people and ideas. This period saw the foundation of England's role as a world maritime power with profound impacts in English society. England's role in, and reliance on, global maritime trade were accelerated by its industrialisation during the latter half of the 18th century. In the later development of that process from around the middle of the 19th century, technological and economic progress gained momentum with the development of steam-powered ships and railways. Britain was the world leader in industrial production at this period and its shipping along global navigation networks ensured that production was kept supplied with its raw materials and that its finished goods reached their export markets in the British Empire and beyond. Many new demands on transport were made which could be more speedily met by steam-powered vessels, especially from the 1840s when iron hulls and the screw propeller were introduced (Hobsbawm 1999; Pearsall 1985). Steamships gradually replaced sailing ships for commercial shipping, although sailing merchant ships continued until into the 1930s for goods such as grain required over long distances in large quantities where speed was not so vital.

In the 1900s, the internal combustion engine and gas turbine replaced the steam engine in most ship applications and transoceanic travel came within reach of more people, growing rapidly in popularity, with the new steam powered ocean liners replacing sailing ships. Driven by strong demand created by European emigration to the United States and Canada, international competition between passenger lines and a new emphasis on comfort, shipping companies built increasingly larger and faster ships. Ocean liners were then the primary mode of intercontinental travel (Beveridge *et al* 2008a, b). Until the 1920s most shipping lines relied heavily on emigration for passengers but by the 1930s, the Great Depression put many shipping lines into bankruptcy.

The impact of U-boats (military submarines) operated by Germany during the two World Wars underlined the importance to England's economic sustainability of keeping its navigation routes open. In this respect, U-boats proved highly effective in economic warfare, enforcing their naval blockade across Britain's transatlantic supply routes.

In the post-war period, air travel captured the transoceanic passenger market, and the shipping companies' passenger liners increasingly relied on the leisure cruise market. Sea transport remains the largest carrier of freight in the world, most of it international rather than between domestic ports.

Today, examples of navigation activities in England include cross channel ferry services such as those from Newhaven to Dieppe, and the transatlantic ocean liners: the launching of RMS Queen Mary 2 and the increasing number of cruise terminals in Southampton illustrating the growth in this business.

VALUES AND PERCEPTIONS

Generally, people observing the sea from land are unlikely to perceive the scale of navigation and shipping activities that occur offshore, or their own reliance on everyday goods carried to England along such navigation routes. That reliance often only becomes widely apparent when a freighter drifts off its navigation route and runs onto the coast, spilling its many and varied goods for the media to report, as in the case of the ***RMS Napoli*** on the Dorset coast in 2007. Distant vessels may be perceived as specific points on the horizon. Inshore fishing and leisure craft are probably seen as more directly linked to coastal communities and the use of the sea.

Ports are often at the heart of large cities so their substantial urban populations get used to seeing shipping traffic which becomes part of the landscape/seascape of their daily lives, for example in Southampton and Portsmouth. There are also related aspects such as ships' horns which sometimes can be heard inland, particularly when it is foggy and these act as a reminder of that local shipping traffic and maritime links.

Many people are engaged in a range of shipping activities, either on board or at the port, so navigation activities are also perceived directly as a source of income and employment for them, while in broader economic terms, their economic impact is immense.

For some people, the sea will always hold special meaning which has inspired many creative and artistic responses. Long-distance journeys have probably long been essential rites of passage for aspiring members of the elite classes, far predating the Grand Tour of the 18th and 19th centuries. The sea may have also been seen as a 'magical' space where, through a long-distance journey, one would disappear from view and enter a different world. The activity of seafaring would have had the power to create specific social identities, binding crews into closely knit groups (Van De Noort 2006, 284).

RESEARCH, AMENITY AND EDUCATION

An important study of navigation routes was undertaken by Wessex Archaeology and funded by the ALSF in 2007: the 'England's Shipping' project used GIS to map shipping movements recorded in historical archives (http://ads.ahds.ac.uk/catalogue/archive/englandship_eh_2007/index.cfm?CFID=3870038&CFTOKEN=64191754).

Wrecks give one indication of navigation and shipping activities and the relationships between navigation routes, wrecks and navigation hazards were explored in the ALSF-funded 'Navigation Hazards Project' (Merritt *et al* 2007). The distribution of wrecks is very densely recorded along the English coast. In addition to wrecks, distributions of artefacts lost or thrown overboard can indicate anchorages, shipping routes or battle sites. The potential for anchorage areas, even in what are now busy modern harbours, has been demonstrated by the 'Dive onto Victory' project in Portsmouth, Hampshire (see http://www.maritimearchaeologytrust.org/victory).

Initiatives integrating into Information and Communication Technologies (ICT) information on navigation networks with developing transport methods, along with historic and present economic data, could be a way of bringing this Character Type into schools to raise awareness about the English maritime legacy and its characteristics.

Features such as long-established ferry crossings in remote or deeply-indented coastlines often still function as valuable public amenities as well as tourist attractions.

HSC itself is designed to be a resource to assist in raising public awareness about offshore activities that often go unnoticed from onshore: one aspect of that will be to engage people with the scale of navigation and shipping activities in their local areas.

CONDITION AND FORCES FOR CHANGE

The effects of this Character Type on today's landscape/seascape are both historic and ongoing: navigation and shipping activities have and will always play key roles for our lives which change through time as our societies, their maritime links, technology and transport methods, and shipping techniques evolve. The use and range of navigation routes in operation now and in the future strongly reflects economic vitality and global levels of trade. In UK waters, those routes will also alter as new container ports are planned and built as, for example, will result from completion of the DP World 'London Gateway' Container Port begun in 2010.

RARITY AND VULNERABILITY

The rarity and vulnerability of this Character Type reflects people's changing economic activity through time. Navigational activity itself is both historic and ongoing: its patterning has much to contribute to our perceptions of our roles and relationships with the wider world. Evidence for past navigational activity is relatively rare, vulnerable to disturbance from modern developments to accommodate new navigational needs, and perhaps under-researched, but there is little evidence that maritime freight is in decline or under threat globally or in its transit using UK navigation routes.

PUBLISHED SOURCES

Bang-Andersen, A, ed, 1985 *The North Sea. A Highway of Economic and Cultural Exchange*, Norway: Norwegian University Press

Beveridge, B, Andrews, S, Hall, S, Klistorner, D. 2008a. *Titanic: The Ship Magnificent - Design and Construction*, Abingdon: History Press Ltd

Beveridge, B, Andrews, S, Hall S, Klistorner, D. 2008b. *Titanic: The Ship Magnificent - Interior Design and Fitting Out*, Abingdon: History Press Ltd

Binns, A. 1985. Towards a North Sea Kingdom: Viking Age incursions and later attempts to establish a Scandinavian rule "west over the sea" in Bang-Andersen, ed, 1985, 49-52

Clarke, H, 1985. The North Sea: A Highway of Invasions, Immigration and Trade, Fifth to Ninth Centuries AD in Bang-Andersen, ed, 1985, 49-62

Friel, I. 2003. *Maritime History of Britain and Ireland*. London: The British Museum Press

Gibbins, D, 1995. What Shipwrecks Can Tell Us. *Antiquity* **69**, 408-11

Hobsbawm, E, 1999. *Industry and Empire*. London: Penguin Books, 412

McGrail, S. 2001. *Boats of the World*. Oxford: Oxford University Press

Merritt, O, Parham, D, and McElvogue, D, 2007. *Enhancing our Understanding of the Marine Historic Environment. Navigational Hazards Project Final Report for English Heritage*, Aggregates Levy Sustainability Fund.

Pearsall A. 1985. Steam enters the North Sea in Bang-Andersen, ed, 1985, 195-216

Van de Noort R. 2003. An Ancient Seascape: The Social Context of Seafaring in the Early Bronze Age, *World Archaeology* **35**, 404-15

Van De Noort R. 2006. Argonauts of the North Sea. A Social Maritime Archaeology for the 2nd Millennium BC. *Proceedings of the Prehistoric Society* **72**, 267-87

Young, R. 2001. *The Comprehensive Guide to Shipwrecks of the North East Coast, Volume 2 (1918-2000)*, Abingdon: The History Press Ltd

WEBSITES

http://www.portofsunderland.org.uk/

http://www.historyofyork.org.uk/themes/viking-invasion

http://www.maritimearchaeologytrust.org/victory

1.1.1.3 Character Type: Navigation Hazard

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Navigation Hazards includes the following Sub-types:

- Wreck hazard
- Drying hazard
- Maritime debris
- Rocky outcrops
- Shoals and flats
- Submerged rocks
- Water turbulence
- Hazardous water

This Character Type relates to areas that contain serious risks to shipping or smaller craft which could lead to damage or complete loss of a vessel. Such risks may be directly related to sea-floor features such as wrecks and other debris and obstructions, drying areas, submerged rocks, shoals, banks and sandwaves, or they may be indirect, including the implied hazardous water in the water column and surface above such seafloor risks. Strong marine currents and their responses to seafloor and coastal topography can also pose serious hazards from water turbulence.

In marine levels, some care is needed to distinguish the location of the hazard from its implications at other levels. As an example, submerged rocks and wrecks pose direct hazards on the sea floor but they also imply 'hazardous water' in the water column and sea surface above and around them. Some rocks and wrecks will project well into the water column in their own right, and some will break the surface, again with hazardous water around them.

Wrecks become dangerous in shallow water when they are either exposed and/or found less than 10m below the sea-level (based on UKHO definition). Therefore, wreck hazard focuses on the area of the hazard, which may include a single wreck or a cluster of wrecks. From the perspective of HSC, wrecks have greatest relevance from their roles as hazards to navigational activity, or as indicators of areas and routes of past navigational, naval or trading activity.

Drying hazards are areas variously submerged but also subject to exposure above the sea surface at various states of the tide, thus forming a grounding hazard to safe passage of shipping. On modern charts these may be indicated by heights shown above chart datum. Historic charts commonly show detail of drying areas or sandbanks as surveyed at the time the chart was produced. Historic drying areas include sandbanks exposed in the past but the location and extents of such areas' exposure at low tide levels are highly susceptible to change due to the mobility of sediments.

Maritime debris refers to an area deemed hazardous due to a predominance of recorded obstructions and fouls not known to be associated with a wreck.

Rocky outcrop refers to an area dominated by rocks rising from the general level of the seabed and breaking the sea surface at some or all states of the tide, posing a risk for navigation.

Shoals and flats are shallow areas of sandbanks, shoals, bars and spits as surveyed at the time the chart was produced. These areas are highly subject to change and they are generally exposed at low tide due to the mobility of sediments.

Submerged rocks are areas dominated by rocks rising above the general level of the seabed, but not breaking the surface of the water at any state of the tide, posing a risk for navigation.

Water turbulence refers to areas of the water column and/or sea surface characterised by heavy swell, strong currents and tidal races which pose a risk for navigation.

Hazardous water refers to areas of the water column and/or sea surface above various sea-floor hazards and in a buffered zone around them. Such hazards may include wrecks, submerged rocks, shoals and flats.

Navigation hazards, past or present, are often difficult to map with precision despite this essentially being the prime purpose of nautical and maritime charts. Major navigation hazards have figured on the earliest Admiralty charts and are often mentioned in historic sailing directions. Early charts inevitably contain less detail and use less accurate survey methods, focussing instead on highlighting approximate areas of the most notorious hazards and those most easily identifiable. However, some early foreign charts (e.g. the Portolan charts and Waggoners) contained a high level of navigational detail, allowing a more comprehensive characterisation of this Character Type. Modern charts depict more accurate and precise information. The majority of areas associated with this Character Type are typically found along the coast or close

inshore. Although wrecks have a much wider overall distribution, their highest densities are also found in inshore waters.

The accuracy of the charts evolved along with improvements in surveying and charting techniques and the frequency of their application. Before the creation of the Admiralty as an official hydrographic branch in 1795, only a small number of independent surveyors such as Greenville Collins and Murdoch Mackenzie undertook surveys covering substantial areas of English waters in a standardised manner (Merritt *et al* 2005).

Throughout English waters, some areas are themselves typically characterised as 'hazards' for navigation such as Goodwin Sands (off the coast of Kent in the English Channel), the Needles (Isle of Wight) or the Western Rocks of the Isles of Scilly. Historical navigation hazards were represented in nautical and maritime charts, showing the mobility of sandbanks and how they significantly changed through time.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type include:

- Historic and modern sandbanks and sand ridges
- Bars, shoals, scars and scarps
- Wrecks and obstructions
- Rocky areas, including exposed rocky coastlines with rocky outcrops, underwater/awash rocks, and maritime debris
- Wreck clusters
- Areas of heavy swell and breaking waves, prevailing winds, and tidal range amongst others

Historically, the sea has been perceived as a dangerous place, with good reason, due to being a relatively alien environment for human survival and with sometimes unpredictable behaviour nature but also due to various human factors. Sea voyages have often resulted in ship losses. Some of the factors contributing to these losses, including some deliberate sinkings, are:

- poor design or failure of the ship's equipment or excessive pressure on the hull
- instability, due to poor design and improperly stowed cargo, amongst others
- navigation errors and other human errors, leading to collisions (with, for example, another ship, rocks and icebergs) or running aground
- bad weather
- warfare, piracy, mutiny, or sabotage including: guns, fire, torpedoes, depth charges, mines, bombs and missiles
- accidental fire
- overloaded with cargo
- intentional sinking (scuttling) to form an artificial reef
- use as a target ship for training or testing weapons
- as a blockship to create an obstacle to close a harbour, river, etc. against enemy ships
- scuttling to prevent a ship from falling into an enemy's hands (e.g. the Graf Spee)
- to destroy a derelict ship that poses a menace to navigation
- as part of an insurance fraud

Especially from mid-18th century onwards, the development of shipbuilding techniques has contributed to reduce some of the unwanted occurrences listed above. The creation of nautical and maritime charts has helped enormously to improve and keep updated the knowledge of previously poorly areas as well as their 'hidden' hazards, providing tools to enable safer navigation.

Navigation hazards were more frequently charted after the 1800s as the Hydrographic Office was established as a sub-department of the Admiralty in 1795 and issued its first officially published Admiralty chart in November 1800

(http://www.nationalarchives.gov.uk/records/research-guides/admiralty-charts.htm). These charts were continually updated and corrected to avoid navigational hazards.

VALUES AND PERCEPTIONS

Navigation hazards have always been a preoccupation for sailors, but it took experience to fully recognise the character of many such hazards. Whether the hazards were exposed or hidden depended on the time that sailors approached the harbour (i.e. either at low or high tide). These hazards became visible in people's consciousness due to the danger associated with them. Very often, tales and myths were associated with them, evoking rhymes and songs. For example, the area around Harwich Haven is particularly notorious and Nelson is reputed to have said that in terms of navigation the Thames estuary is one of the worst areas around the UK, being as "tricky as a tiger" (Bowskill 1998, 159).The reputation of Gunfleet Sand alone is illustrated by a poem, 'L'Envoi', written by Rudyard Kipling.

Sandbanks are often named and well-known by the general public for a variety of reasons. For example, Kentish Knock, on the approach to the Thames Estuary is remembered for the battle named after it, as well as for being the first home of Radio Caroline.

The creation of nautical and maritime charts generally expressed and recorded the knowledge of the surveyed area but they also represented a tool for recording hazards and other dangers associated with the sea and keeping them updated.

Wrecks were fatal for many but also highly dramatic events for those who lived to tell the tale and add to the local heritage of stories about dangers on the high seas. They are now also perceived as recreational opportunities, with the many wrecks of the region being dived upon by amateur dive groups and professional organisations.

Many wrecks are also valued for their addition to habitat diversity in their areas. For similar reasons wrecks are also valued by the fishing community as they attract certain prey species.

RESEARCH, AMENITY AND EDUCATION

Through the Aggregates Levy Sustainability Fund (ALSF) distributed by English Heritage, Bournemouth University undertook the 'Mapping Navigational Hazards as Areas of Marine Archaeological Potential' project. The project developed a methodology for identifying and mapping areas of maritime archaeological potential by characterising areas exhibiting trends in ship losses due to environmental, structural and meteorological navigational hazards, which have been described in historical sources such as charts and pilotage documents (Merritt *et al* 2005, 2007).

Wrecks serve as important habitats for aquatic life since they act as artificial reefs which increase biodioversity in their areas. In this sense, wrecks are often seen as beneficial by marine ecologists. Therefore, further collaborative work between marine biologists and archaeologists would be beneficial to enable a deeper understanding of species living in wreck sites, how they contribute to the wreck preservation, and contextualising this information within broader sea dynamics.

Wrecks can also be used as useful tools for amenity and educational initiatives. Shipwrecks often attract divers. 'Respect Our Wrecks' is a campaign which educates

divers about preserving our common underwater cultural heritage, whilst also demonstrating the environmental value of those sites. Wrecks provide opportunities for divers to explore and engage with the past and by respecting them, present and future generations can enjoy and learn from them (http://www.bsac.com/page.asp?section=3200&sectionTitle=Protected+Wrecks). Wrecks are therefore not only recreational tools but also educational ones, allowing a more comprehensive understanding of the different uses and dangers of the sea. In terms of formal education, wrecks can provide excellent cross-curricular case studies on which to base investigations covering a range of curriculum subjects.

There may also be a link between the occurrence of sea-floor obstacles and the presence of wrecked craft, lost gear or accumulated prehistoric or historic deposits. Environmental conditions will also indicate whether there is potential for preservation of prehistoric or historic materials.

CONDITION AND FORCES FOR CHANGE

This Character Type is and will increasingly be affected by projected direct and indirect changes due to global warming and sea level change. Variations on sediment distribution and oceanographic conditions (e.g. sea level, wave height and direction and storminess), which are difficult to predict with accuracy (BRITISH GEOLOGICAL SURVEY 2002), will certainly affect this Character Type. The response of the coastline to scenarios of climate change was considered by a consortium led by Halcrow Maritime working on a DEFRA-funded project called 'Futurecoast'. Futurecoast provides predictions of coastal evolutionary tendencies, which are to be considered in the updating of Shoreline Management Plans (SMPs) and other strategic plans targeted at determining broad-scale future coastal defence policy throughout the open coast shoreline of England and Wales

(http://www.halcrow.com/Our-projects/Project-details/Futurecoast-England/)

The preservation of wrecks will depend, amongst other factors, on the construction materials and the natural environment where they wrecked. For example, exposed wooden components will generally decay quickly. In general, wooden parts of ships that survive are those that were buried in silt or sand soon after sinking. An example of this is the Mary Rose (Portsmouth Historic Dockyard). Steel and iron, depending on their thickness, may retain the ship's structure for decades. As corrosion takes place, sometimes helped by tides and weather, the structure collapses.

Climate change impacts on, for example, water temperature, are already changing the microclimate where wrecks are located and hence their preservation. At national and regional levels, there are also records of casualty losses which are generally known from documentary references. These casualty records show the potential of wrecks in an area but do not necessarily show their existence (e.g. casualty records at the National Record of the Historic Environment (NRHE). Today's prevalent marine conditions will also affect the degree of survival of wrecked vessels and casualty losses, especially regarding sediments movements or scouring by currents.

Physical hazards, such as banks, shoals and rocky outcrops amongst others, are subject to a broad range of influences including erosional and accretional processes. However, their rate of change and extent may be influenced by human-made activities or constructions that change the marine conditions. The changing nature of sandbanks and shoals means the character of the landscape/seascape is in continuous change. This changing character may reveal material remains that are regularly or sometimes only rarely exposed before being covered again (as for example in the Protected Wreck *Stirling Castle*, off Kent). Some features and remains may be more or less permanently embedded within such bedforms and will only be revealed after seismic survey (e.g. see Gaffney *et a*l 2007).Sea dredging and beam trawling may seriously affect seabed obstructions and wrecks, whether known or unknown. This would take the form of both direct damage to wreck structures, contents and setting, and the destabilisation of sites resulting in renewed corrosion and potential decay (Val Baker *et al* 2007). The

Aggregates Levy Sustainability Fund (ALSF) distribution by English Heritage to a range of coastal and marine projects has demonstrated that collaboration between regulators, the heritage sector and the aggregates industry can be very positive in promoting environmentally friendly extraction, helping enable more effective conservation of the historic environment and the cultural legibility of its character for present and future generations (see Dellino-Musgrave 2007).

RARITY AND VULNERABILITY

Navigation hazards are an integral part of the cultural seascape character of many areas of our coasts and seas, expressed directly through their records on charts and by prompting of highly visible maritime safety installations. But they are also present culturally in the vast store of myths, legends, traditions and stories of the sea and its dangers that pertain to most coastal communities and are a strong element in local distinctiveness that holds an attachment for their inhabitants and an appeal to visitors. In the dynamic coastal and marine environment, navigational hazards will always be present and while their risks may be diminished by modern navigational aids, they will not disappear. Their positive and negative contributions to local distinctiveness will inevitably continue.

PUBLISHED SOURCES

British Geological Survey, 2002. *North Sea Geology: Strategic Environmental Assessment - SEA2 & SEA3 Technical Report 008_Rev1*, BGS on behalf of DTI

Dellino-Musgrave, V, 2007. *Marine Aggregate Dredging and the Historic Environment: Joint Initiatives for a Sustainable Management.* ACUA Underwater Archaeology Proceedings 2007 Papers presented at the 2007 Society for Historical Archaeology Conference on Historical and Underwater Archaeology, Williamsburg, Virginia.

Gaffney, V, Thomson, K, Fitch, S, eds, 2007. *Mapping Doggerland. The Mesolithic Landscapes of the Southern North Sea*. Oxford: Archaeopress

Merritt, O, Parham, D, McElvogue, D, 2005. *Enhancing our Understanding of the Marine Historic Environment: Navigational Hazards Project Source Appraisal*, Bournemouth: Bournemouth University on behalf of English Heritage

Merritt, O, Parham, D, McElvogue, D, 2007. *Enhancing our Understanding of the Marine Historic Environment: Navigational Hazards Project Final Report*, Bournemouth: Bournemouth University on behalf of English Heritage,

Val Baker, M, Tapper, B, Johns, C, Herring, P. 2007. *England's Historic Seascapes: Scarborough to Hartlepool and Adjacent Marine Types*, Truro: Historic Environment Service, Cornwall County Council on behalf of English Heritage

WEBSITES

http://www.english-heritage.org.uk/professional/advice/our-planning-role/consent/protected-wreck-sites/

http://www.bsac.com/page.asp?section=3200&sectionTitle=Protected+Wrecks

http://en.wikipedia.org/wiki/Keelmen

1.1.1.4 Character Type: Maritime Safety

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Maritime Safety includes the following Sub-types:

- Daymark,
- Lighthouse;
- Buoyage;

- Safety area (offshore)
- Safety Services (including coastguard stations, coastguard cottages, and lifeboat stations amongst others).

HSC mapping is not to be used for navigation. Its mapping selects and depicts maritime safety features solely as part of its own assessment of historic seascape character.

'Maritime safety' includes areas containing features usually erected at important or dangerous points on or near the coast for the warning and guidance of mariners, and areas occupied by structures serving the safety needs of coastal or marine users of the sea. Some safety features can be sited well inland, such as church towers and spires used a navigational aids and more generalised place-finders.

A 'Daymark' refers to an unlit, highly visible and distinctive feature on the coast that can be used by mariners for navigation during daylight only (NRHE Monument Type Thesaurus). Numerous features have been deployed as daymarks for sighting, navigation and survey. Some were specifically built as daymarks, often brightly painted to enhance their visibility; others include features such as churches, beacons, windmills, factory chimneys, primarily built and used for other purposes but serving, from a maritime perspective, to identify a known coastal location to aid navigation to varying degrees of precision. Lighthouse towers commonly also serve as daymarks, hence their white colour, and may continue to serve as such even if the light itself has been decommissioned as, for instance, at St Agnes Lighthouse, Isles of Scilly. In a less precise position-finding role, prominent hills and distinctive coastal headlands were often brought into play for a similar purpose along coastlines otherwise lacking in distinctive features or with confusingly repetitive coves and inlets.

A 'Lighthouse' is a tower or structure, with a powerful light or lights at the top, usually erected at an important or dangerous point on or near the sea-coast for the warning and guidance of mariners (http://thesaurus.english-heritage.org.uk/).

Buoyage refers to floating, fixed markers used to indicate to a navigator a sea area to approach or avoid (http://thesaurus.english-heritage.org.uk/). Single, or arrangements of, buoys, beacons and lights are often used to demarcate safely navigable entrances to estuaries and rivers, submerged hazards and foul areas.

A 'Safety area' refers to areas of the sea with advised or designated restrictions on navigation, or exclusion from permitted navigation altogether, to promote maritime safety. These areas may respond to a variety of dangers, for example: to facilitate safe passage around marine, coastal or estuarine hazards or between shipping lanes or they may be exclusion zones for safety reasons around offshore oil and gas installations or military practice areas.

'Safety services' refer to coastguard and lifeboat stations and National Coastwatch Institution (NCI) lookouts located at strategic points to monitor the coastline and, in the case of lifeboat stations, to launch search and rescue missions.

For obvious reasons the majority of features associated with this Type are typically found on or adjacent to the coast although daymarks may be well inland. Navigable entrances to estuaries and rivers, areas of submerged hazards and foul areas are often demarcated by tracks of posts, buoys, lights, beacons, bells and topmarks. In more stable areas, the sites of some navigation aids have a long history, being repeatedly represented on Admiralty charts and maps since their inception. On land, daymarks were commonly used in sighting, survey and navigation, also providing the triangulation basis for surveying maritime charts and coastal profiles.

Some areas of the sea are themselves characterised as 'safety areas', with advised or designated restrictions on navigation, or exclusion from permitted navigation. These may be designed to facilitate safe passage around coastal or estuarine hazards or between shipping lanes, or exclusion zones for safety reasons around offshore oil and

gas installations, or military practice areas. Also important in maritime safety are the coastguard and lifeboat stations and lookouts dotted strategically along the coast.

The scale of features mapped within this Type will, as always, depend of the purpose and intended presentation scale of the HSC but where some have a character effect well beyond their physical size, smaller features may have been buffered to ensure their depiction.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type include:

- marine navigation aids such as areas of buoys, beacons and lights;
- land-based navigation aids such as lighthouses, fog stations, daymarks (e.g. churches, beacons, windmills, chimneys, distinctive topography, distance marks and lights), topmarks, distance marks and lights.
- coastguard stations;
- lifeboat stations

Areas advised or designated as zones of restricted navigation or exclusion for safety reasons are also included.

The coast and sea have always brought opportunities to farm, harvest, trade, export and import, emigrate or immigrate. In conducting such activities, mariners have always faced the challenges presented by the sea, not only those inherent such as storm conditions, obstacles and sandbanks, but also those posed by other people's activities, including from wrecked vessels or at times of war.

From the prehistoric into the medieval period, non-instrumental methods were generally used for navigation during sea voyages. Stars were used for course-steering and orientation; distances were estimated in terms of a standard day's sail; prevailing directions of winds and currents were understood and used, and the influence of the moon.

There is evidence for the use of sounding leads to gauge sea-floor depths from around 2nd century BC in the Mediterranean (*ibid.*). The use of magnetic compasses is known from medieval times (around 12th century) and sandglasses were used from around 13th century. Navigational instruments improved in the 15th century with the development of astrolabes, quadrants and cross-staffs in southern Europe. These devices measured the altitude (angle in the sky) of the sun and stars, which made it possible to calculate latitude, a crucial step for transoceanic navigation. There was no accurate means of determining longitude until Johns Harrison's perfection of the chronometer in c.1736 (Sobel and Andrews 1998). So prior to the 1600s, seamen used their experience and knowledge for sea voyages and safety at sea, known as Environmental Navigation (McGrail 1998, 2001; Parker 2001).

Determining and following a course relied in part on the recognition of coastal features, such as headland shapes, church spires, and other landmarks. It was preferred to approach a destination in daylight so hazards could be recognised in good time. At night, of course, such features could often not be seen, so in some places rudimentary lighthouses were erected. In England the earliest example, within Dover Castle, dates to the Roman period. By the medieval period, at least thirteen lighthouses are thought to have existed in medieval England, some lights maintained by religious bodies (one renowned example being on St Michael's Mount, Cornwall) while others were funded by local shipping tolls (Friel 2003, 85-6),. During this time, buoys and poles were also used to mark sea channels, so mariners could avoid shallow water, although very little is known about this. Evidence for seamarks becomes clearer in the 16th century with the appearance of buoyed channels laid and maintained by organizations such as Trinity House of Deptford. Founded in 1514, Trinity House survives today as the body responsible for lighthouses and other navigation features in England and Wales

(http://www.trinityhouse.co.uk/) following an Act of Parliament in 1836 which gave the organisation compulsory powers to levy out private individuals who owned lighthouses.

Eddystone Lighthouse, built by Henry Winstanley, was first English lighthouse to be built on a rock at sea; located 28 miles off Plymouth, it was completed in 1698 but was washed away during the Great Storm of November 1703, along with Winstanley himself (Hart-Davis and Troscianko 2002). Light vessels (ships which serve as lighthouses in areas lacking suitable sites for lighthouse construction) were historically employed in the 18th and 19th century particularly around the east coast and the treacherous approach to the Thames. Most are now obsolete but some survive, as over the Seven Stones reef near the Isles of Scilly.

Sea-charts were first developed in 13th century Italy, but were probably not used in northern Europe until the 16th century. The earliest known English sea-chart dates from the 1530s. Sea-charts are practical and visual tools to enable safe navigation. Historically, they were also used for colonial policy, serving as a guide for exploration and material conquest (Mrozowski 1999, 154). Maps and charts were manifestations of how the world was perceived and experienced, offering an analogue for the acquisition, management and reinforcement of knowledge and power (Bender 1999, 32; Colwell-Chanthaphonh and Hill 2004). Modern charts, whose compilation in the UK is the responsibility of the UK Hydrographic Office (UKHO), are regularly updated both in their representation of the landscape for maritime purposes and in their portrayal of maritime safety features around the coasts and seas.

Lifeboats were originally run independently by maritime communities who would rescue those who got into trouble at sea. In 1824, the National Institution for the Preservation of Life from Shipwreck was formed. The change of name to the RNLI took place in 1854, which is still being used today. The RNLI took over the running of the lifeboats across the country although a single independent lifeboat still exists at Caister in Norfolk.

Today, the Maritime and Coastguard Agency (MCA) provides a response and co-ordination service for maritime search and rescue (SAR), counter pollution and salvage. The SAR role is undertaken by HM Coastguard, which is responsible for the initiation and co-ordination of civil maritime SAR. This includes the mobilisation, organisation and tasking of adequate resources to respond to people either in distress at sea, or in inland waters, or to people at risk of injury or death on the cliffs and shoreline of the UK. As part of its response, HM Coastguard provides Coastguard Rescue Teams for cliff and shoreline search and rescue purposes (MCA 2008).

VALUES AND PERCEPTIONS

Maritime safety features inevitably have a strong integration with our landscape and seascape perceptions. As a part of the coastline or shoreline, to fulfil their roles they generally have to be readily recognisable and distinctive, with strong contribution to the present landscape/seascape.

Lighthouses, beacons, and daymarks are iconic markers of place for many people viewing them both from land and sea. They bridge the perceptual boundaries between land and sea. The strength of emotional feeling many attach to them is clear in the many responses sometimes provoked by the proposed decommissioning of lighthouses, from those fearing the loss of a feature they see as a vital element in their perceptions of a particular part of the coast, an example being the reaction to suggestions in 2010 that Godrevy Lighthouse in Cornwall might cease operation.

Safety installations that employ sound, such as fog horns and bells, have an immediate effect alerting mariners about the dangers ahead but similarly have a landward dimension too, their often haunting sound sometimes carrying far inland.

Some maritime safety sites are less obvious to those not involved in maritime activity. These are the church spires and towers, factory chimneys, tall towers, communications masts and the like, which were not built or primarily used for maritime safety but which

serve, from the maritime perspective captured by HSC, as daymarks or generalised place-finders. The same applies to the cultural adoption for the same purpose of distinctive headlands and cliffs which may be otherwise little-modified.

Lighthouses have also been a source of inspiration and subject matter for many artists and writers, for example James F Cobb's 1920 adventure novel 'The Watchers on the Longships: A Tale of Cornwall in the last Century' and Virginia Woolf's 'To the Lighthouse' (1927) inspired by Godrevy Lighthouse and summer holidays in Cornwall.

RESEARCH, AMENITY AND EDUCATION

Considerable documentary evidence exists regarding this Character Type, both in archaeological and historical studies and on historic and modern charts. Further research using landscape-based approaches may enhance our understanding of past perceptions of the sea and coastline and their dangers, as with current Dutch work using early map reference points to ascertain the locations of now-drained estuarine channels where numerous wrecks were recorded.

The use of landmarks and navigation aids facilitated the development of surveying techniques and the drafting of maritime charts and coast profiles. Further research can identify features still archaeologically extant but now lost to knowledge.

Plotting the location and understanding the development of coastguard stations along the coast would give valuable information about the development of hazards and preventative methods for coastal trades of all types (Val Baker *et al* 2007).

Lighthouses are often used as amenity resources, open to the public. Further educational initiatives could be developed to enable a better understanding of the development of maritime safety in England.

This Character Type lends itself well to local, regional and national case studies appropriate for the Secondary National Curriculum especially geography which looks at how places and landscapes are understood and how people, their perceptions and their environment interact.

CONDITION AND FORCES FOR CHANGE

Although navigation aids, particularly those at sea, are often replaced and renewed, their mooring sites may still hold evidence of successive use and re-use. This is exemplified in the use of fixings, piles and other materials to anchor these features to the seabed.

Terrestrial markers are increasingly becoming disused, since these traditional methods are being replaced with radio, satellite navigation, digital marine charts and seismic technologies. This is true also of lighthouses, with debates ongoing about their relevance since we are currently living in a society that is using Global Positioning Systems (GPS) for most navigation. Arguments that lighthouses no longer justify their costs of maintenance are countered by those that want to retain them as a fail-safe should GPS systems fail.

RARITY AND VULNERABILITY

Many navigational aids are sited in locations vulnerable to coastal erosion processes, not only from the sea but extreme weather conditions too. Suck risks apply to substantial structures including lighthouses too, several of which are at risk from erosion, particularly in the East Anglian region where Happisburgh and Orfordness lighthouses are under medium term threat.

Maritime safety structures are vulnerable too from technological advances: electronic and digital systems offering comprehensive position-finding and chart data readily available to most marine users and making redundant many well-spaced material fixtures which rely on visibility for their operation. Coupled with that obsolescence, pressures on public finances are forcing the increasing centralisation of safety services and closure of some smaller coastguard stations.

PUBLISHED SOURCES

Bender B. 1999. Subverting the Western Gaze: Mapping Alternative Worlds in P, Ucko, R, Layton, eds, in *The Archaeology and Anthropology of Landscape. Shaping your Landscape*, London: Routledge, 31-45

Colwell-Chanthaphonh, C, and Hill, J. 2004. Mapping History: Cartography and the Construction of the San Pedro Valley, *History and Anthropology* **15**, 175-200

Friel, I, 2003. *Maritime History of Britain and Ireland*, London: The British Museum Press

Hart-Davis, A, and Troscianko, E, 2002. *Henry Winstanley and the Eddystone Lighthouse*, London: Sutton Publishing

MCA. 2008. *Search and Rescue Framework for the United Kingdom of Great Britain and Northern Ireland*. Southampton: MCA

McGrail, S, 1998. *Ancient Boats in North West Europe*, London: Longman

McGrail, S, 2001. *Boats of the World*, Oxford: Oxford University Press

Mrozowski, S, 1999. Colonization and the Commodification of Nature, *International Journal of Historical Archaeology* **3**, 153-66

Parker, A J, 2001, Maritime Landscapes in Muir, R, ed, *Landscapes*, Macclesfield: Windgather Press

Sobel, D, and Andrews, W J H, 1998. *The Illustrated Longitude*, London: Fourth Estate

Tapper, B, and Johns, C. 2008. *England's Historic Seascapes. Consolidating the National Method. Final Report*, Truro: Historic Environment Service, Cornwall County Council on behalf of English Heritage

Val Baker, M, Tapper, B, Johns, C, Herring, P. 2007. *England's Historic Seascapes: Scarborough to Hartlepool and Adjacent Marine Types*, Truro: Historic Environment Service, Cornwall County Council on behalf of English Heritage

WEBSITES

http://www.trinityhouse.co.uk/

http://www.rnli.org.uk/

1.1.2 Broad Character: Industry

1.1.2.1 Character Type: Extractive industry (Minerals)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Extractive Industries (minerals) includes the following Sub-types:

- Aggregate dredging
- Aggregate quarrying
- Quarrying
- Mining (coal)
- Mining (metals)
- Mining (other)
- Mining (unspecified)

Extractive industry (minerals) refers to imprints from industrial activity focussed on primary extraction of minerals from the earth, including stone, specific minerals, and ores, along with initial processing at extraction sites. It includes coal but excludes

hydrocarbons which come under the 'Energy Industry' Character Type. Coverage by HSC is limited to areas of extractive industrial character located along the coast and within the marine zone.

Aggregate dredging involves the extraction of sand and gravel by dredging from the sea-floor, for use principally in construction and civil engineering. It includes past and active dredge zones, wharves used by dredgers and associated onshore facilities for washing, screening, and preparation.

Aggregate quarrying refers to areas of past or present extraction of sand and gravel by quarrying on land, also for use principally in construction and civil engineering, and includes closely associated facilities for washing, screening, and preparation.

Quarrying refers to areas of past or present open-cast extraction of stone, used principally in construction and civil engineering, and excluding aggregates, coal, specific minerals and ores. It includes closely associated spoil heaps and facilities for initial processing and transportation from extraction site. Coastal sites are often favoured for quarrying due to outcrop exposures and ease of access and transport.

Mining (coal) refers to areas characterised by past or present extraction of coal, whether by open-cast, pit or by shaft. It includes closely associated spoil, processing and transport facilities and processing waste. Such closely associated spoil may include colliery waste spread onto nearby shores. Some coastal coal mines extend into strata located beneath the sea-floor. Almost all onshore coal resources in England occur in strata of the Carboniferous system approximately 356-299 million years old. In England, coals of Mesozoic and Tertiary age are insignificant onshore but occur over large areas offshore (BRITISH GEOLOGICAL SURVEY 2001). In general, extensive re-landscaping is undertaken after the end of mining at a site with the aim of returning to other productive uses of the land, often transforming the legibility of past Character Types expressed in today's landscape. For example, the impact of coal mining on the coastal dimension has been significant in some areas such as the North East (Co Durham) and Cumbria. It produced 'black beaches' formerly covered with sand, creating large scale topographic changes. However in another highly cultural intervention, subsequent management initiatives, with strong and necessary levels of public engagement, have now removed much of that coal waste from the shoreline (see http://www.turning-the-tide.org.uk/).

Mining (metals) refers to areas characterised by past or present extraction of metal ores, whether by open-cast, pit or by shaft. It includes closely associated spoil, processing and transport facilities and processing waste. Such extraction may be focussed on single metal ores or, commonly, complex ore bodies from a diversity of economically-significant metals and minerals. Coastal metals mines often extend into strata located beneath the sea-floor.

Mining (other) refers to areas characterised by past or present extraction of known minerals other than metal ores, coal, salt, clays, stone for construction, and aggregates. It covers mining whether by open-cast, pit or by shaft. It includes closely associated spoil, processing and transport facilities and processing waste. Economically-significant minerals may include such items as gypsum, cobalt, arsenic, jet, wolfram, fluorspar and uranium.

Mining (unspecified) refers to areas characterised by past or present extraction by open-cast, pit or by shaft but whose stone/metal/mineral resource is not specified in sources available to the HSC assessor. It includes closely associated spoil, processing and transport facilities and processing waste.

This Type is usually an intrusion across other Types of contemporary and earlier date, as extractive industries and their components are generally determined by the underground location of their object. It includes quarrying, dredging and mining, by open-cast, pit and shaft. Most mines, quarries and dredging works develop over some time; while earlier features may be partly effaced by later activity; there are commonly

traces of earlier technologies, plant, dumps, scours, etc, among remains from later working.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Overall, typical components of this Character Type include:

- mines;
- quarries;
- wharves;
- dredging vessels;
- office, storage and factory buildings;
- mine workings, including open-cast and pit workings;
- waste tips, dumps, and spoil heaps;
- specifically associated transport systems (such as tunnels, railways and harbours).

Marine aggregate deposits (MADs) are sands and gravels of economic value that can be found on the seabed. Marine aggregates are used primarily for building and construction purposes and a substantial proportion of the United Kingdom's need for aggregates is obtained from the seabed. Currently the UK is reliant on marine-sourced aggregates to a far higher degree than virtually any other nation in the world (Flatman and Doeser 2010, 164). Dredging activity is closely related to market demand, therefore activity within licensed areas can be sporadic and difficult to predict (Rogers 1997).

Using marine resources reduces the pressure to work minerals on land where resources are constrained in areas of agricultural, environmental or development value (ODPM 2005). It is known that there are very extensive deposits of soft aggregates (i.e. sand and gravel) in English waters. Their distribution is uneven with variable thickness, illustrating the complex geological history of the seabed (ODPM 2005). Two main areas of maximum MADs potential have been identified: the southern North Sea and the English Channel (Wenban-Smith 2002). Processes such as climate change and fluctuation of sea levels over the last 2 million years contributed to the deposition of sand and gravels which now lie on the seabed (Gubbay 2005). These materials were originally deposited by river systems that are now submerged (BMAPA 2000; ODPM 2005). The seabed was periodically exposed as dry land, creating a space for human occupation and the potential for associated past human remains on those landscapes. Over the last twenty years the growth and development of the offshore extraction and construction industries have increasingly threatened the submerged archaeological resource. The past character of these submerged environments is now being recognised at national and international level by both heritage organisations and seabed developers (see www.jnapc.org.uk). As a result, initiatives promoting environmentally friendly extraction have been developed. For example, the Aggregates Levy Sustainability Fund (ALSF) demonstrates how this scheme has enabled English Heritage to support a range of timely initiatives, providing new insights into mitigation, assessment, evaluation and potential of the marine historic environment through remote survey and field investigation. Historic Seascape Characterisation (HSC) has considerable contributions to make to apply our understanding of the historic character of the marine zone to the key licensed aggregates extraction areas to the median line with UK neighbours.

Whilst coal fuelled the Industrial Revolution during the 18th and 19th centuries, oil and gas were the most important natural fuel resources to be discovered in England during the later 19th and the 20th century. They provide energy and essential chemicals for the home, industry, and the transport system as well as earning valuable export and tax revenues to support the UK economy.

Gypsum has been a basic ingredient of the plaster industry for building, rendering and decorative purposes since the 13th century. It has been used more recently for medical and surgical purposes, in the pottery, brewing and paper industries, and still on a large scale for building-plaster and plasterboard. Alabaster is a fine-grained, compact form of gypsum, and has been valued since the medieval period as a material for carving, domestic ornamental and decorative work. The gypsum industry includes the processes of mining, quarrying, transporting, preparing and producing gypsum. The mining technology used to exploit gypsum is similar to that used in other mining industries. Rock gypsum or alabaster scrap is crushed and ground to powder in plaster mills, prior to being heated in a kiln to remove most of its water content and produce 'Plaster of Paris', while higher temperatures produce a pure plaster. Typical components comprise similar elements to those found in other mining industries such as adits or levels, open-cast workings, gin circles, engine houses, inclines and a range of associated buildings, together with grinding mills and kilns, as well as specifically associated transport systems.

Alum was imported into England mainly from the Middle East before the 15th century, and, from the late 15th century onwards it was imported from the Papal States for hundreds of years. Alum was primarily used in the textile industry as a dye-fixer (mordant) for wool. England's most important medieval industry, the wool trade, relied upon a steady supply of alum since the value of the cloth depended on how well it was dyed. However, these sources were unreliable and there was a push to develop a source in England especially as imports from the Papal States were ceased following the excommunication of King Henry VIII. With state financing, attempts were made throughout the 16th century, but without success until early on in the 17th century (http://en.wikipedia.org/wiki/Alum). During this time, the attention was centred upon North East Yorkshire due to the discovery of a Jurassic Upper sequence of rock strata that outcropped in a thick band in the coastal cliffs to the north and south of Whitby (and in certain inland locations) and which contained aluminium sulphate (the vital ingredient of alum). The production of English alum was concentrated in this region for the next 250 years, stimulating the development of other industries and helping to lay the foundations for the Industrial Revolution from the 18th century. In general, alum quarries and their associated spoil tip represent the first stages of the manufacture process. The next stage in the process was to extract the aluminium sulphate from the calcined rock by soaking it in water. This was undertaken in large stone tanks called steeping pits requiring a constant supply of fresh water. The secondary processes were undertaken in a purpose-built factory called the alum house. These were often some distance from the quarry, so the raw liquid had to be transported. Once at the alum house, the raw liquid was boiled and concentrated to a point where the aluminium sulphate would crystallise with the addition of an alkali. The crystals were then purified through a sequence of washing and re-crystallising cycles. The details of this process were a closely guarded secret, and no contemporary accounts survive. Typical components of this industry include: quarries; steeping tanks; alum houses; storage and office buildings; reservoirs; waste tips, dumps, and spoil heaps; and specifically associated transport systems such as tunnels, railways, harbours and rock-cut tracks crossing rocky shores for loading beached cargo vessels.

Ironstone works have had a long history in England. Ironstone is used as a component in some ceramics, commonly known as 'ironstone china' (a hard white earthenware). Most early ironstone was made in Staffordshire because of the abundance of clay and the proximity of a seaport for shipping the finished wares to North America and Europe. During the 17th century, several Staffordshire potteries produced a ceramic ware that they called 'stone china'. Josiah Wedgwood manufactured a 'stoneware' china in the 19th century that could be mass-produced. It was commonly used for heavy-duty dinner services in the 19th century. Charles Mason took out a patent for 'Mason's Ironstone China' in 1813 as a cheap alternative to porcelain. Ironstone china was also very popular during the 1970s (http://en.wikipedia.org/wiki/Ironstone). In some areas, ironstone deposits have been strip mined, resulting in deep linear quarries known as

'gullets', surrounded by extensive areas of spoil. Some of these former workings have been returned to agriculture, but others (e.g. Twywell Gullet) support limestone grassland rich in plant species such as orchids (http://www.naturalengland.org.uk/ourwork/conservation/geodiversity/englands/counties/area_ID25.aspx). Usual components include mines; quarries; bloom furnaces and slags; office and factory buildings; waste tips, dumps, and spoil heaps; and specifically associated transport systems (such as railways and harbours.

The use of jet has a long history, reaching back to the early fourth millennium BC in England and flourishing again in the Roman period. Best known now for its use as a symbol of mourning in Victorian times after the death of Prince Albert in 1861, jet has been accorded a special status during many periods in the past. Its rarity and aesthetic appeal have led to its use as a prestige commodity. In England, the only commercially viable deposits of jet occur in North Yorkshire Moors. Although most jet was mined from inland strata on those Moors, some of the 'jet rock' outcrops along the coast near Whitby and Robin Hood's Bay, giving rise to a distinctive local jewellery industry in those coastal towns and villages which thrived in the 19th century and still survives to a much smaller extent today. These particular deposits have high levels of aluminium and this produces jet of extremely high quality. Usual components include: mines and adits, which are a type of entrance to an underground mine (in both cliffs and foreshore); waste tips, dumps, and spoil heaps.

Potash is used worldwide in almost every major agricultural industry. It is used as a fertilizer on grain crops such as corn, soybeans, oil palms, coffee, sugar cane, cotton, fruit and vegetables. The majority of potash production goes into fertilizer, but it is also used in commercial and industrial products (e.g. from soap to television tubes) (British Geological Survey 2006). Potash is worked by underground mining methods. Waste products include the discharging of clays and salt. Boulby Mine is the only potash mine in operation in England. Usual components include mines and exploration boreholes; office and factory buildings; and specifically associated transport systems (such as railways, roads, ships and docks).

England is a major source internationally of china clay. Extensive quarrying of the Hensbarrow Downs, mid-Cornwall (and to a lesser extent on Bodmin Moor and the south-western fringes of Dartmoor) has created a unique landscape of large open quarries and associated spoil heaps and infrastructure forming a distinctive skyline to this part of the south west peninsula when viewed from the sea. Facilities to export the clay to the potteries of the Midlands, and latterly to the paper mills of Northern Europe, were purpose-built at Par in the early 19th century but the harbour there was closed to clay traffic in the late 2000s and most clay is now exported from the deep-water port of Fowey.

Quarrying has played a major role in the economic and maritime history of England. The remains of many slate quarries can be seen along the North Cornish coast, along with the facilities to export the slates from these, and larger quarries inland. The early demand for granite was met by moorstone from West Penwith, Bodmin Moor, and Dartmoor, but as demand increased larger quarries were opened and facilities for transport of the material expanded. Much of the stone from the dimension quarries of the later 19th century such as De Lank were carefully cut and dressed and used in major engineering works such as lighthouses (Herring and Rose 2001). The Isles of Purbeck and Portland are renowned for their limestone and are dotted with the remains of quarrying. Quarrying for Purbeck marble and Portland limestone dates back to Roman times for sarcophagi and inscribed stones and to the medieval period for building stone. Much of London was rebuilt using these stones following the Great Fire of London. Portland cement is also manufactured here from raw materials extracted locally (Cement and Concrete Basics website).

The mining of metals has a long and significant history in the country and the South West has nationally important centres for iron production in the Forest of Dean, for lead in the Mendips, and for tin and copper in Cornwall and west Devon. Evidence for iron

ore extraction in the region goes back to the Roman period with furnaces excavated at Chesters Villa on the Severn (Mullin *et al* 2009, 24). Roman ironworking has been identified on Exmoor and more tentatively in Cornwall, adjacent to the fort at Restormel (Smith in Thorpe 2007, 27). It is likely that the smelted metal would have been transported by sea to centres of production. Lead production in the Mendips is centred on Charterhouse and, although it may have begun prior to the Roman conquest, is concentrated around the 1st to 3rd centuries. Evidence from the distribution of the highly characteristic ingots suggests that the lead was transported by road to the south coast for export to Gaul and beyond (Holbrook 2008, 155). Likewise, the North West was important for iron and coal mining, as well as iron and steel processing. These were the main drivers behind the development of settlement and industry along the west Cumbrian coast from the 17th century onwards. Cumbria had the first undersea coal mine, at Saltom near Whitehaven, which was a classically planned town built with its own harbour to take advantage of the overseas trade in coal from the 17th century.

Tin and copper mining has a rich and diverse history in the South West with tin likely to have been exploited since the beginning of the Bronze Age in Cornwall and west Devon. Trade with the Mediterranean world has been inferred from scraps of ancient writings thought to ultimately derive from the autobiographical account of the voyage of Pytheas of Massalia, sadly now lost, who describes tin streaming and the working of the tin into ingots, as well as the customs of the merchants and sailors who traded between Belerion (Cornwall) and Gaul (Cunliffe 2002, 76). Industrial mining from the 18th century brought great wealth to Cornwall, as well as cycles of boom and bust, and technological innovations associated with the industry spread around the world, along with a great Cornish diaspora. Many of the mines were coastal and the sight of engine houses lining the rugged Cornish cliffs is a powerful national symbol as well as providing landmarks for coastal craft. Many of the coastal lodes will have been identified by miners engaged in their summer occupation of fishing and shafts and galleries may extend out from the coastline for some distance.

England is essentially self-sufficient in mined rock salt (salt extraction by evaporation from brine is discussed under the HSC Character Type text for 'Processing Industry'). Historically, rock salt mining has been carried out since at least the medieval period with exports having exceeded imports at times. Trade is currently roughly in balance (British Geological Survey 2004). England has huge resources of rock salt (British Geological Survey 2004). Office and factory buildings were usually set up adjacent to the extraction sites and brine reservoirs were built. Rock salt mining produces no waste but has been associated with subsidence of overlying surface land. Salt is now produced in only two areas in England: Cheshire and the North York Moors National Park (British Geological Survey 2004).

England has been a producer of building stone for hundreds of years. The country posses a varied geology, with wide range of building stone types available and the quarrying of such stone is of great importance. The use of these various types of stone has influenced architectural style throughout the nation (http://www.bgs.ac.uk/mineralsuk/buildingStones/home.html). Sandstone has been in demand due to its hardened quality when weathered which makes it resistant to the effects of immersion, and therefore useful in harbour works. Usual components of quarrying include pits, waste tips, dumps, and spoil heaps; and specifically associated transport systems (such as railways, roads, ships and docks).

Smaller-scale extractive industries have included clay for agriculture and brickmaking, copperas for a number of chemical purposes, and coprolite for fertiliser.

VALUES AND PERCEPTIONS

There are many tangible and intangible reminders of England's rich and varied mining past along our coastline, both directly and in the infrastructure, the harbours, quays and wharves, which served them. The remains of these often extensive industrial processes on the present landscape/seascape can generate complex and mixed feelings

in different regions and places, in part dependent on people's closeness in time and family ties to these industries. Some may link this Character Type, especially its coal industry expressions, to a hard labouring life, with many workers who suffered illnesses, but for many it also invokes feeling of pride in their industrial past. In the present coastal landscape it is also often represented by the artificial landforms of reclaimed spoil heaps and post industrial communities with no obvious economic base after the mines closed.

The Durham Heritage Coast's 'Turning the Tide' project provides an exemplary initiative on the need to engage strongly with people's emotional attachments to recently closed extractive industries along the coast while addressing the ongoing environmental issues they generate and creating a forward-looking future for the coming generations (see http://www.turning-the-tide.org.uk/).

The level of cultural values attached to the deep mining of the South West was underlined by the recent inscription of the Cornwall and West Devon Mining Landscape as a World Heritage Site in 2006. The Cornwall and West Devon Mining Landscape World Heritage Site bid built on the large base of interest and enthusiasm for Cornwall's industrial past that already existed. There are many people in Cornwall who worked in the industry and the last mine only closed down in 1998. In addition many have family ties to the industry in the form of parents and grandparents. The success of the WHS bid has validated this interest and encouraged others to think of the remains of the industry in a positive light. The remains of the industry are a powerful reminder to many of prosperity and a time when Cornwall was at the heart of the Industrial Revolution.

Coastal quarrying is often viewed negatively whilst operations are ongoing but their industrial remains, trackways and the bases of cranes for loading stone onto coastal shipping have also lent distinctiveness to many stretches of our coastline and provided sources of considerable research interest to industrial archaeologists. Some coastal quarries are on such a scale that they form impromptu position-markers for passing mariners. Abandoned quarries may form important recreational areas, and are often valuable wildlife or geological sites. They may also be used as rubbish dumps, both official and unofficial.

Many of the indirect effects of extractive industry often go unrecognised, such as the development of nearby towns and the generation of wealth expressed in large 18th and 19th century landowners' estates.

RESEARCH, AMENITY AND EDUCATION

Through the Aggregates Levy Sustainability Fund (ALSF) Regional Environmental Characterisation (REC) surveys have taken place, collecting baseline information on large areas of the seabed to enable better informed environmental assessments (http://www.alsf-mepf.org.uk/projects/rec-projects.aspx).

Besides also funding the Historic Seascape Characterisation (HSC) projects, the ALSF has supported a number of research projects related to the historic environment including establishing guidance (Marine Aggregates Dredging and the Historic Environment (2003)) and a protocol for finds reporting at all stages of extraction (Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest). This has seen wide-scale reporting of archaeological finds and a significant interest in the historic environment within the dredging community. This was accompanied by an awareness programme funded by the ALSF and implemented by Wessex Archaeology including visits from archaeologists to workplaces, a newsletter (Dredged up from the Past) and a training DVD. One of the most significant consequences of the Protocol is the recent find of 75 Palaeolithic tools from dredging Area 240, approximately 8 miles east of Great Yarmouth. These were discovered on a wharf in Holland during sorting and sourced back to Area 240, following which an ALSF project was initiated to fully explore the area with some interesting results.

A wealth of research has been produced on extractive industries addressing issues surrounding the environmental footprint of quarrying and the sustainable provision of aggregates (see http://www.sustainableaggregates.com/index.htm). Furthermore geophysical surveys are a requirement for offshore aggregate extraction to enable, amongst others, the assessment of the impact of these developments on the historic environment. These surveys also have potential to increase knowledge of the historic environment for an area. This information will feed into the local and national monuments records and inform future curatorial decisions, providing an opportunity for beneficial cumulative knowledge regarding marine archaeology.

Extensive research has also been undertaken regarding coal mining in England. It would be useful to explore further links of this industry with the marine environment to provide a deeper understanding of this industry as a whole nationally and internationally.

Further research on the industrial archaeology in England would be beneficial to enable public access to, and appreciation and enjoyment of, the historic environment for present and future generations.

The presence of quarries has provided an opportunity to display cross-sections through the underlying geology at a large number of locations and many of these are Regionally Important Geological/Geomorphological Sites (RIGS).

The inscription of the Cornwall and West Devon Mining Landscape as a World Heritage Site in 2006 has created a focus for visitors to the various components of the industrial heritage of the area as well as encouraging cultural events with mining themes, lecture programmes covering all aspects of the site, and exhibitions displaying aspects of the landscape.

Today's impact of the extractive industries in England can be seen through the wide range of museums and abandoned quarries use for amenity and educational purposes, many of which are coastally situated (e.g. Geevor, West Penwith, for the Cornish deep mining industry). The ALSF has also provided a wide range of educational initiatives including two Derek the Dredger children's books, emphasising aspects of aggregate extraction, marine archaeology, marine biodiversity and how such industries work together and the Aggregates to Outreach Teaching Pack with curriculum linked lesson plans and handling collections (see www.hwtma.org.uk).

CONDITION AND FORCES FOR CHANGE

The condition of coastal extractive industrial remains varies considerably: from almost total destruction to excellent preservation. Coastal remains from these industries are prime targets for public-awareness initiatives in the context of the forthcoming coastal access requirements from the Marine and Coastal Access Act 2009. This access will need care in its routing to avoid increasing visitor erosion on surviving features.

Former extractive industrial sites are often classed as 'derelict land' which has been gradually 'tidied-up' by farmers or subject to expanding housing and industrial developments: in such cases, liaison with the relevant heritage planning advisers is needed to conserve and/or record earlier features where they still survive. In some areas the remains of early industry have been damaged or destroyed by cliff falls, for example the coastal remains of Saltom Coal Pit, Cumbria, now a scheduled monument, are considered to be at risk from both coastal erosion and potential cliff falls from the rock wall on its landward side.

RARITY AND VULNERABILITY

In terms of rarity, extractive industries (minerals) occur, of course, where their resource lies. Jet mines and alum works are nationally confined to north east, in particular to the North Yorkshire Moors. Ironstone mines, however, can be found in other parts of England.

In terms of vulnerability, raising awareness of industrial remains in England will make them more sustainable as a resource and part of the cultural legibility of the landscape and seascape accessible to present and future generations. The vulnerability of the landscapes and seascapes produced by these industries derives in large part from their susceptibility to neglect and collapse; to the development and 'restoration' of 'derelict land', and to needs to address inherited and unresolved problems of ongoing pollution from such industrial remains. However some of those 'polluting' aspects are more matters of perception – claims of 'visual pollution from unsightly industrial remains' – which may be short term and liable to change to more positive views if effectively addressed by public awareness campaigns while retaining the features in question to inform future generations of their cultural inheritance.

PUBLISHED SOURCES

British Geological Survey, 1999. *Minerals in Britain. Past Production... Future Potential,* Nottingham: BGS on behalf of DTI

British Geological Survey, 2004. Mineral Planning Factsheet: Salt, London: BGS on behalf of ODPM (www.mineralsUK.com)

British Geological Survey, 2006. Mineral Planning Factsheet. Potash. London: BGS on behalf of ODPM (www.mineralsUK.com)

BMAPA. 2000. *Aggregates from the Sea. Drawing Strength from the Depths.* London: BMAPA

Cunliffe, B, 2002. *The extraordinary voyage of Pytheas the Greek*, Penguin

Flatman, J, and Doeser, J, 2010. The International Management of Marine Aggregates and its Relation to Maritime Archaeology, *The Historic Environment* **1, 2**, 160-84

Gubbay, S, 2005. *A Review of Marine Aggregate Extraction in England and Wales 1970-2005*, Report for The Crown Estate

Herring, P, and Rose, P, 2001. *Bodmin Moor's Archaeological Heritage*, Truro: Cornwall County Council

Mullin, D, Brunning, R, and Chadwick, A, 2009. *Severn Estuary Rapid Coastal Zone Assessment Phase 1 Report*, Gloucestershire County Council and Somerset County Council

ODPM. 2005, *Marine Mineral Guidance 1: Extraction by Dredging from the English Seabed*

Rogers, S I, 1997. *A review of closed areas in the United Kingdom Exclusive Economic Zone.* CEFAS Science Series Technical Reports No. 106

Thorpe, C, 2007. *The Earthwork at Restormel Farm, Lostwithiel, Cornwall. Archaeological Site and Finds Evaluation*, Truro: Cornwall County Council

Wenban-Smith, F, 2002. *Palaeolithic and Mesolithic Archaeology on the Seabed: Marine Aggregate Dredging and the Historic Environment*, London: BMAPA, English Heritage and Wessex Archaeology

WEBSITES

http://www.bmapa.org/

http://ads.ahds.ac.uk/project/alsf/

http://www.jnapc.org.uk

http://www.thecrownestate.co.uk/

http://www.naturalengland.org.uk/

http://www.mineralsUK.com

http://www.dmm.org.uk/mindex.htm

http://www.englandsnortheast.co.uk/

http://www.cefas.co.uk/publications/techrep/tech106.pdf

http://www.alsf-mepf.org.uk/projects/rec-projects.aspx

http://www.cement.org/basics/concretebasics_history.asp

1.1.2.2 Character Type: Energy Industry

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Energy Industry includes the following Sub-Character types:

- Hydrocarbon field (gas)
- Hydrocarbon field (oil)
- Hydrocarbon installation
- Hydrocarbon pipeline
- Hydrocarbon refinery
- Power station (fossil fuel)
- Power station (nuclear)
- Renewable energy installation (wind)
- Renewable energy installation (tidal)
- Renewable energy installation (wave)
- Submarine power cable
- Overhead power cable

The Energy Industry Character Type covers areas whose dominant character is concerned with the extraction, processing and/or storage of hydrocarbons (oil, oil derivatives, and gas, but not coal); installations relating to all forms of renewable energy generation, by wind, wave or tide, and power stations of all fuels, together with their associated transmission facilities and directly associated transport facilities.

Hydrocarbon field (gas) refers to a production area for natural gas from naturally occurring reserves. Those reserves occur in organic-rich rocks such as oil shales or coal; hydrocarbons form when they are subjected to high pressure and temperature over extended periods. Mapping of these areas by HSC relates to the areas dominated by the production activity, not the full known area of the geological reserves.

Hydrocarbon field (oil) refers to a production area for oil from naturally occurring reserves. Those reserves occur in organic-rich rocks such as oil shales or coal; hydrocarbons form when they are subjected to high pressure and temperature over extended periods. Mapping of these areas by HSC also relates to the areas dominated by the production activity, not the full known area of the geological reserves.

England's offshore oil and gas originate from two sources: 1) from subsidence and burial of marine limestones under thick accumulations of basin sediments approximately 140 million years ago which have generated gas from coal source rocks; and 2) from deeply-buried mudstone source rocks from approximately 65 million years ago. Thus commercial petroleum reservoirs occur in almost every sedimentary succession ranging in age from approximately 410-36 million years (British Geological Survey 2001). Most of the UK-produced oil and gas for domestic consumption comes from the UK Continental Shelf. As that resource is in decline, it is expected that England will increasingly depend on imported oil and gas.

Hydrocarbon installation refers to an installation, for example a drilling platform, directly involved in the extraction of oil and natural gas. Closely associated structures include pipelines, platforms, tanker moorings, storage containers, warning signals and lights. Unauthorised navigation is prohibited within 500m of all such structures. Whether HSC depicts individual hydrocarbon installations or subsumes them under a 'hydrocarbon field' is guided by the dispersal of such installations within a production area, the purpose of the HSC and, especially, its intended viewing scale.

Hydrocarbon pipeline refers to a pipeline involved in the transmission of oil or natural gas between facilities involved in their extraction, processing, storage or distribution.

Hydrocarbon refinery is a building or structure that processes and refines oil and natural gas, such as an oil refinery or gas compressor station. This includes directly associated storage, transmission and transport facilities such wharves and docks.

Power station (fossil fuel) refers to a building or set of buildings and structures where power, especially electrical or mechanical, is generated, using fossil fuels: coal, oil or natural gas (http://thesaurus.english-heritage.org.uk/). This includes a power station's directly associated storage, transmission and transport facilities.

Power station (nuclear) refers to a complex of buildings producing power derived from nuclear energy (http://thesaurus.english-heritage.org.uk/). This also includes these power stations' directly associated transmission facilities.

Renewable energy installations are subdivided for HSC into their main power sources, wind, tidal and wave power, and refer to buildings, sites and structures associated with the harnessing of those sources for electrical power generation. This includes wind farms, tidal mills, tidal barrages and wave power-generation technology, their directly associated electrical transmission and distribution facilities and other related features such as tidal pools.

Submarine power cable refers to a cable used to transmit electricity from the mainland to islands or to offshore installations, or to link offshore electricity generators to the onshore national electricity grid.

Coverage by HSC is limited to areas of energy industry character where its imprints are situated along the coast and within the marine zone. Those imprints show some distinctive features within the overall energy industry, for example the coastal emphasis in the siting of nuclear power stations and the increasing focus on offshore locations for some of the UK largest wind-farms. UK hydrocarbons output is now in long term decline but in 2001 there were still almost 500 platforms and 10,000 kilometres of oil and gas pipelines running between offshore production wells and terminals on land, mostly in the North Sea.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical historical components of this Type include:

- oil and gas fields;
- slag heaps and offshore spoil dumping grounds;
- sub-sea wells and wellheads;
- fixed platforms and drilling rigs;
- large, sprawling industrial complexes;
- cooling towers, chimneys;
- distribution depots and customer service centres; and
- Associated transport systems (such as railways, roads, ships, docks and tanker terminals). It is important to note that transport links are covered by the relevant 'Transport' Sub-types.

Oilfields are mostly found offshore in the UK, in the North Sea. A small onshore coastal oilfield is exploited on the Isle of Purbeck, Dorset. From the 1960s, while coalmines and railways were closing, oil and gas refineries were opening, both trends having impacts on the communities they were supporting and their coastal infrastructure. An example is the sharp decline in the 1980s in coal exports from Blyth Harbour, Northumberland, already under economic pressure from closure of its shipbuilding industry in the 1960s.

Natural gas from land-based reservoirs has been utilised to provide heating and lighting since the late 18th century. However, the situation changed in the 1960s and 1970s when a national conversion programme from 'town' gas to natural gas took place, with natural gas first discovered in English waters in 1965 and oil in the 1970s. By the mid 1980s there were over 100 oil and gas installations in the North Sea although the industry has been in decline since the beginning of the millennium.

When the first full scale nuclear power station was opened at Calder Hall, now Sellafield on the Cumbrian coast, by the Queen in 1956 the Lord Privy Seal, Richard Butler, described the event as "epoch-making". Subsequently 11 Magnox power stations were built in the UK. Nuclear power stations have a markedly coastal distribution, facilitating their requirements for huge quantities of cooling water. Within that coastal spread their tendency towards more remote locations reflected, from the start of the industry, concerns over the safety of the technology but also a recognition of the industry's strong defence links and a desire ensure their operation was secure and, to an extent, hidden from the public gaze. In 1997 nuclear power contributed 26% of the UK electricity but this figure declined with the closure of several nuclear power stations. Many were also ear marked for closure at the end of their planned functional lives in 2015 however, the Government has recently proposed the construction of a series of new power stations with the go-ahead given for reactors at Hinckley Point, Somerset, and Sizewell, Suffolk.

The UK has huge resources in wind, tidal and wave power. Wind power is the fastest growing form of global electricity generation and has become increasingly important in recent years, following the UN Framework Convention for Climate Change agreed in Rio in 1992 and the subsequent Kyoto protocol of 1997. This proposed a global cut of 5.2% greenhouse gas emissions by 2008-2012, specifically committing the UK government to reducing greenhouse gas emissions to 12.5% below 1990 levels by 2008-2012. In 2000, the Crown Estate announced the first round of UK offshore wind farm development (Round 1). Round 1 was to cater for demonstration scale projects of up to 30 turbines with the selection of sites largely driven by developers. Later, the Round 2 tender process was for commercial scale projects within the Greater Wash, the Thames Estuary and Liverpool Bay areas, with the aim of meeting the offshore wind capacities identified by the Strategic Environmental Assessment (SEA). In 2008, and following an announcement made from the Department for Business, Enterprise and Regulatory Reform (BERR) on the launch of an SEA of UK waters to open up the seas to up to 33 GW of offshore wind energy, The Crown Estate announced proposals for Round 3 offshore wind farm leasing comprising nine zones: Moray Firth, Firth of Forth, Dogger Bank, Hornsea, Norfolk, Hastings, West Isle of Wight, Bristol Channel and Irish Sea. Wave power in the UK is at an early stage of development. For tidal power, between 2008 and 2009, five options were being considered for a tidal barrage across the Severn Estuary. The UK Government ended that consideration in October 2010 by announcing it saw no strategic case for such a barrage for the foreseeable future. Advancing wave energy generation, the South West Wave Hub, which was installed off Hayle on the north coast of Cornwall in 2010, is a grid-connected offshore facility for the large scale testing of technologies that generate electricity from the power of the waves.

Submarine power cables are represented in the England by the HVDC Cross-Channel which is a high voltage direct current (HVDC) connection that operates under the English Channel between continental Europe and the UK. The first HVDC Cross-Channel went into service in the 1960s. Because this first installation did not meet the

increasing requirements, it was replaced in the 1980s by a new HVDC line with over 45 kilometres of submarine cables present in the sub-sea floor.

VALUES AND PERCEPTIONS

This Character Type is often stimulates varied and complex and strongly held views, differing according to the interests being considered, the energy source, and the region and place concerned. In the most generalised terms some think that energy generation by any available means is a 'necessary evil' to support our society; others that we should move to more renewable methods which generate energy in is 'clean, safe and reliable' way. Others feel that the energy production is inherently an 'eyesore', 'noisy', cannot be wholly environmentally friendly and is just one aspect of a more universally unsustainable relationship between human economies and the world we inhabit.

The controversy is exemplified by Sizewell power station in Suffolk. The industrial complex incorporating the characteristic dome of Sizewell B dominates the coastline, as do the power lines that emanate from it. The structure is located within an Area of Outstanding Natural Beauty (AONB) and has therefore been the subject of much debate, some seeing the visual effects as now an iconic aspect of the distinctive character of this stretch of the Suffolk coastline, while others see it as an iconic visual symbol of the unacceptable intrusion of unsustainable and dangerous modern technology into an 'unspoiled' area (albeit one considerably shaped by previous human activity including a strong military presence).

The use of nuclear power has always been controversial, not least because of the problems and uncertainties surrounding radioactive waste storage for indefinite periods. The potential for severe radioactive contamination by accident or sabotage, and the possibility that its use could indirectly lead to a proliferation of nuclear weapons are also viewed as unacceptable by some communities of thought.

Renewable energy generation also produces strong and sometimes polarised views. It is considered by many as a 'sustainable' means of energy generation, offering solutions to issues of global concern in all dimensions of sustainable development: economical, ecological, and social. From that standpoint, renewable sources of energy may be perceived as benign symbols of hope. However, renewable energy complexes are also seen by many as high-profile visually-intrusive features impinging on familiar and highly valued landscape and seascape, also add to levels of noise, smell and activity in 'tranquil' settings.

The UK Government agrees that renewable energy is central to securing a diverse and sustainable energy supply which will achieve the UK's carbon dioxide emission reduction targets. Questions about the capacity of renewables to meet that aim alone, coupled with a future 'energy gap' apparent in the UK's generation capacity against its energy demands, have led to proposals to build a new generation of nuclear power stations coupled with a major expansion of offshore wind generation under the Round 3 leases being offered by the Crown Estate (http://www.thecrownestate.co.uk/energy-infrastructure/offshore-wind-energy/).

RESEARCH, AMENITY AND EDUCATION

Decommissioning of nuclear power plants offer opportunities to undertake research into the landscape/seascape character perceptions surrounding such highly visible complexes, building on recent Scottish work on the heritage aspects of the Dounreay Nuclear Power Station.

The development and maintenance of the offshore energy industry creates large amounts of data relating to the seabed, most notably geophysical data. This is an invaluable resource for the offshore historic environment, providing information on past landscape surfaces as well as shipwrecks and other intrusive features. In addition renewable energy developments are often accompanied by educational facilities in order to inform the general public about the benefits of this type of installation and any additional data produced.

The hydrocarbon industry is declining and a record of its history may be valuable. A recent project undertaken by the British Library National Life Story Collection and the University of Aberdeen entitled 'Lives in the Oil Industry' recorded first hand oral accounts of working in the oil and gas industry in order to preserve this history.

Considerable numbers of these industrial areas are founded on reclaimed land, often drained saltmarsh and mudflats, infilled from the late 19th century onwards. These buried deposits may have considerable potential for preserving palaeoenvironmental material and artefacts and features associated with estuarine environments.

Public amenity may be limited by health and safety considerations but other possibilities could be explored such as virtual and interactive displays. Even so, the former nuclear power station at Sellafield, Cumbria, has a visitor centre and is a key tourist attraction for the west Cumbrian coast, outside of the Lake District National Park.

General policy trends show an expansion of renewable energy with an encouragement of wind power, especially in offshore locations where more consistent strong wind speeds are available. Within this context, recognition of existing historic environment considerations in planning future wind farms is expressed, for example, by the Collaborative Offshore Wind Research Into The Environment (COWRIE), a company set up by The Crown Estate to raise awareness and understanding of the potential environmental impacts of the UK offshore wind farm programme. COWRIE published a guidance note for best practice in survey, appraisal and monitoring of the historic environment during the development of offshore renewable energy projects in the UK (Oxford Archaeology and George Lambrick Archaeology and Heritage 2008; Wessex Archaeology 2007). Historic Seascape Characterisation (HSC) can inform that on the typical historic character of areas under consideration for renewable energy developments, adding area-based context of the commonplace processes that have shaped an area to the more traditional point-based records of the rare and the special in the historic environment.

CONDITION AND FORCES FOR CHANGE

Output from the largest oil producers – the UK and Norway – has now peaked and entered a period of long term decline. In 2001, around 500 platforms and 10,000 kilometres of rigid and flexible oil and gas pipelines were running between offshore production wells and terminals on land (CEFAS 2001).

Increasing concerns relating to the finite nature of hydrocarbons and the burning effect these resources have on global warming places is increasing pressure on the energy industry sector. Nuclear power has been the main form of alternative energy production with renewables increasing as a share of overall UK energy production. Renewable energy is viewed by the UK Government as an essential element to tackle climate change. Recent debates suggest that new nuclear power stations are unlikely to make a significant contribution to current needs. However, it has also been stated by government that even though '*the share of renewables will grow, it is likely that fossil fuel generation will meet some of these needs. Given the likely increase in fossil fuel generation…, it is important that much of this nuclear capacity is replaced with low carbon technologies. New nuclear power stations could make an important contribution to meeting our needs for low carbon electricity generation and energy security…'* (BERR 2008; for further details also see http://www.decc.gov.uk).

Expansion of offshore windfarms raises many concerns about seascape impacts, both visually and across the full depth of the marine levels, where the material imprints occur which inform our understanding of marine historic character. These considerations will be accommodated for particular windfarm proposals by the landscape considerations required to be included in their necessary Environmental Impact Assessments (EIA). HSC has a particular role in informing those EIAs on the historic cultural dimension of seascape.

RARITY AND VULNERABILITY

Oil and gas working installations are found in coastal expressions within the overall English mainland and territorial and continental waters. If any remains of installations are found, statutory designation for modern structures exists in the form of designated safety zones around them. The purpose is to protect the safety of people working on or in the immediate vicinity of the installation and the installation itself against damage. They also provide the additional benefit of protecting fishermen and other mariners by reducing the risk of collision with the installation and preventing loss of gear which can become snagged on underwater equipment (Val Baker *et al* 2007).

An environmentally responsible approach will continue to be encouraged within this sector. There is government legislation that ensures consistent standards throughout the offshore industry (e.g. DEFRA 2002; HM Government 2009). Relevant archaeological guidance notes regarding the energy industry sector are also publicly available (Oxford Archaeology and George Lambrick Archaeology and Heritage 2008; Wessex Archaeology 2007). Since their publication, Historic Seascape Characterisation (HSC) has emerged providing an area-based assessment of the historic character of the typical in the coastal and marine zones.

PUBLISHED SOURCES

BERR (Department for Business, Enterprise and Regulatory Reform), 2008. *Impact Assessment of the Government's White Paper on Nuclear Power*, London: BERR (download: http://www.berr.gov.uk/files/file43205.pdf)

British Geological Survey, 2001. *North Sea Geology: Strategic Environmental Assessment - SEA2 Technical Report 008*, British Geological Survey on behalf of DTI

CEFAS, 2001. *North Sea Fish and Fisheries: Strategic Environmental Assessment - SEA2 Technical Report 003*, CEFAS on behalf of DTI

DEFRA, 2002. *Safeguarding our Seas. A Strategy for the Conservation and Sustainable Development of our Marine Environment*, London: Department for Environment, Food and Rural Affairs

HM Government. 2009. *Marine and Coastal Access Act 2009*, London: HM Stationary Office Ltd

Oxford Archaeology and George Lambrick Archaeology and Heritage, 2008. *Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy*, Oxford: Oxford Archaeology, George Lambrick Archaeology and Heritage on behalf of COWRIE

Val Baker, M, Tapper, B, Johns, C, Herring, P. 2007. *England's Historic Seascapes: Scarborough to Hartlepool and Adjacent Marine Types*, Truro: Historic Environment Service, Cornwall County Council on behalf of English Heritage

Wessex Archaeology, 2007. *Historic Environment Guidance for the Offshore Renewable Energy Sector*, Salisbury: Wessex Archaeology Ltd on behalf of COWRIE

WEBSITES

http://sine.ncl.ac.uk

http://www.british-energy.com

http://www.nationalgrid.com/

http://www.offshore-sea.org.uk

http://www.decc.gov.uk/

http://www.statutelaw.gov.uk/Home.aspx

1.1.2.3 Character Type: Processing

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Processing Industry includes the following Sub-types:

- Chemical works
- Iron and steel works
- Industrial production (unspecified)
- Sewage works
- Nuclear reprocessing
- Spoil and waste dumping
- Lime production
- Salt production

The Processing Industry Character Type covers a broad range of processing and production industries which have a particular relevance for HSC due to their distinctively coastal and/or maritime expression and occurrence.

Chemical works refer to an industrial complex involved in the production of chemicals (http://thesaurus.english-heritage.org.uk). Likewise, 'iron and steel works' refers to an industrial complex for large-scale production of iron and/or steel in the 19th and 20th centuries. Both chemical works and iron and steel works are often located on the coast and in or near ports to take advantage of imported raw materials and for the distribution and export of finished products.

Industrial production (unspecified) refers to an area of facilities relating to industrial production but whose chief product is not specified in sources available to the HSC assessor. The areas included here will have aspects giving them a distinctively maritime character.

Sewage works refers to an area in which sewage is filtered and purified in large rectangular or circular tanks (http://thesaurus.english-heritage.org.uk). This includes associated outfalls, pipelines and diffusers.

Nuclear reprocessing refers to an industrial area for the decommissioning of structures associated with the nuclear industry, reprocessing of nuclear materials, nuclear waste management and/or nuclear fuel manufacturing activities take place.

'Spoil and waste dumping' refers to marine areas regularly used and licensed for the disposal of domestic and/or industrial waste. Material deposited may include dredging spoil, drilling waste, treated sewage, domestic refuse and other land waste.

'Lime production' covers areas associated primarily with the transport and production of burnt lime from limestone, largely for agricultural use but also for lime mortar. It includes lime kilns and contiguous associated infrastructure such as quays, jetties and loading ramps.

Salt production refers to coastal and areas concerned with the production of salt for use primarily in food preparation and the preservation of foodstuffs, notably fish and meat. Areas dominated by rock salt mining are discussed separately under the Character Type text for 'Extractive Industry'.

'Processing Industry' is directly related to the production and manufacture and, indirectly, to the consumption of goods. For example, iron is the most widely used of all the metals. Its low cost and high strength make it indispensable in engineering applications such as the construction of machinery and machine tools, automobiles, the hulls of large ships, and structural components for buildings. Since pure iron is quite soft, it is most commonly used in the form of steel (http://en.wikipedia.org/wiki/Iron). Timber has been mainly used for shipping and building industries, as well as fuel. Brick,

tile and clay have been generally used in the building industry as well as the production of pottery. When different types of clay are used in combination with different minerals and firing conditions, earthenware, stoneware, and porcelain can be produced, which have been shipped and distributed commercially at a global scale for several hundred of years. Typical examples are tin-glazed earthenware, the first white pottery (often painted) manufactured in England during the 17th century. In the 18th century, industrial and technological developments enabled standardised productions and mould-made sets, amongst others (e.g. creamware and saltglaze types) (see Draper 1984; Gaimster 1997; Gesner 2000). Sugar refining was a significant production industry in the centre of Liverpool in the post medieval period, and a number of sugar houses are known. Large quantities were imported through the docks from the West Indies, on the final leg of the triangular slave trade.

Areas occupied by processing industries developed considerably through time, usually leaving traces of earlier technologies, either materially or as influences on later plant layouts. Sometimes in production areas, earlier industrial features could be partially impacted by later workings while traces of earlier non-processing features could also be identified, such as remains of settlements and fields pre-dating the industrial complexes.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of Processing Industry include:

- chemical works
- iron and steel works
- timber yards
- brick, tile and clay works
- potteries
- glassworks
- mills
- lime kilns
- cement works
- roperies
- warehouses
- engine and boiler works
- sewage treatment works
- water treatment works
- sewage pipelines
- diffusers
- outfalls
- pumping stations
- reservoirs
- saltworks

English society experienced a period of transformation during the 18th century, especially between 1750 and 1800, when industrial developments, inventions and new scientific discoveries were taking place within the context of a growing capitalist system. This period contained complex social dynamics that had profound impacts on local, regional, national and international scales. These changes were expressed in this

first phase of Britain's industrialisation from about 1750, in which economic growth accelerated rapidly, creating a cycle of positive feedback where that growth was both a cause and a product of the economic and social transformations occurring at that time (Hobsbawm 1999, 12).

Patterns of production and consumption were transforming at the end of the 18th century, and English society demanded much greater quantities of certain goods while maintaining quality standards. Industrial and technological developments responded with more standardised productions and mould-made sets, amongst others changes. The industrialisation process also stimulated changes in cultural attitudes, ideas, world-views, work practices and life styles in different areas of England, impacting hugely on the character of past and present societies.

The iron and steel industries were particularly significant both during this early phase of industrialisation and in its later development and expansion during the 19th century. These industries were used in the production of machinery, tools, ships, weapons and buildings. Iron and especially steel allowed the development of more precision machine requirements as needed in the manufacture of efficient steam engines and eventually enabling the construction of, for example, railways (Appleton 1929); steam-powered shipping; cranes for loading goods at wharves and quays; rifled military guns for longer range coastal defence, and a diversity of later 19th century coastal recreation facilities such as the large piers projecting into the sea on steel supports.

From a maritime perspective timber yards and roperies were particularly important suppliers for shipbuilding. The second half of the 17th century experienced a great demand for timber, especially within the growth of the shipping and house building industries.

Warehouses are intimately linked to the processing industries and are used by manufacturers, importers, exporters, wholesalers, transport, businesses, and customs amongst many others. Historically, warehouses load and unload goods, sometimes directly from railways or seaports. For example, the complex of dock buildings and warehouses at Albert Dock (Liverpool), opened in 1846, and were the first warehouse structures in England to be built from cast iron, brick and stone, with no structural wood. As a result, it was the first fully non-combustible warehouse system in the world, a major advance on the earlier fireproofing of timber structural supports in mills and warehouses. At the time of its construction, the Albert Dock was considered a revolutionary docking system because ships were loaded and unloaded directly from the warehouses.

Brick and tile works are generally poorly documented but there is evidence of the industry dating as far back as the Romano-British period, with indications that it was introduced to England by the Romans (Rowe 2000). In the later medieval and early post medieval periods, the brick industry was given a stimulus from bricks imported to coastal ports as ballast in shipping from continental ports where brick usage was already prevalent.

Regarding sewage, there was no controlled method for the disposal of liquid waste effluent until Victorian times. Before then, rivers, streams, tidal estuaries and the sea provided the means for carrying away waste. By the early 19th century, the rapid growth of towns and cities and the development of industry created major problems concerning waste disposal whose significance as a cause of mass disease outbreaks, notably the spread of cholera and typhoid fever, was only recognised in the 1850s. London responded by constructing enclosed interceptor sewers whose contents were pumped into the Thames downstream. Treatment at extensive sewage farms was also taking place in some towns. By the end of the 19th century, sewage farms became overloaded due to the continuing growth in population. As a result, more intensive handling methods were devised, the infrastructure of which still required large areas of land. These methods were gradually replaced by the more space-efficient activated sludge technique (developed in the 1910s). By World War II, much land previously

occupied by sewage farms had become redundant and was subsequently used for housing, leisure facilities and industry (Department for the Environment Industry Profile 1995).

Lime production began in Britain in the Roman period to supply demands for lime mortar and plaster for the construction of stone buildings. Kilns from this period are found throughout much of England but with a concentration in the south. The advent of medieval castle and church building saw a revival in the use of lime as a building material. However from the 16th century, it was the recognition that burning lime produces material that lowers soil acidity and increases soil fertility that led to the construction of large numbers of lime kilns, often, in lime-deficient areas, with a particular bias towards coastal locations to where the raw materials, limestone and coal, could be imported. Rising populations to feed and wars with France in the 18th century saw a rapid growth in the demand for lime: kilns were built alongside nearly every creek and landing point in some parts of the country, particularly in those areas lacking in shelly beach sand which could be used for the same purpose. Since the south-west of the country possessed little limestone of its own, and had predominately acidic soils, most lime and the fuel coal was imported, from South Wales but also nearer to hand from Plymouth and Dorset along the south coast (Isham 2000). The construction of lime kilns often necessitated purpose-built quays or rock-cut landing places.

Before the 18th century, almost all salt used in England was produced by various methods of boiling brine, most derived directly or indirectly from seawater but some was supplemented by inland brine wells in Cheshire and around Droitwich, Worcs. The resulting coastal bias in salt production was enhanced from the medieval period by extensive use of salt for preserving fish for inland markets or for export. Coastal evidence for early salt production, dating back in Somerset to the Middle Bronze Age, comprises finds of coarse pottery (briquetage) from boiling vessels, trays and pedestals, often accompanied by hearth debris. By the later Iron Age and Roman periods this leaves some extensive surviving landscape features, notably the debris mounds known as 'red hills' beside present and former coastlines of Essex and Suffolk, but extensive Roman salt production has left similar debris along the south and south west coasts. Documented medieval coastal salt-making was widespread; field evidence from Cumbria and Lincolnshire includes saltworks boiling concentrated brine extracted from salt-encrusted silts, a process called 'sleeching', associated with extant mounds of waste and filter pits. From the late medieval period, coal-fuelled direct boiling of seawater dominated: associated coastal features include rock-cut cisterns, embanked 'saltpans' to trap quantities of seawater, especially along the Cumbria, Northumberland and Durham coasts using adjacent coal deposits, and workers' cottages. Mined Cheshire rock salt and cheap sea-salt imports from Brittany rendered most English coastal sea-salt production uneconomic in the 18th century except along the Hampshire coast: Portsmouth's naval victualling needs supported extensive salt-making on Lymington marshes until 1865: large embanked evaporation ponds survive there with traces of the salthouses. At Teesside, salt was refined from brine pumped from underground deposits from 1863 to 2002.

The chemical industry is a significant coastal industry, particularly in the north of England where it developed in relation to other industries from the late 18th century. Alkali production was centred on Tyneside in the north-east and on Merseyside and Deeside in the north-west. When mixed with fat, alkali was used to make soap, and the industry grew and developed with the introduction of industrial-scale cloth production. When mixed with lime and sand, alkali was used to make glass, and industrial-scale glass production became important industries on Tyneside and Merseyside. Chemical products like soap, dyes and bleach were increasingly in demand and the need for glass also encouraged the industry. Such works also produced soda, alum and Epsom salts. One of the biggest problems associated with the alkali works was pollution, mainly from emissions of hydrochloric acid fumes which devastated the neighbouring countryside.

One solution was to build tall chimneys to drive the fumes further away, creating a visual impact which changed the character of the landscape and seascape of the area.

VALUES AND PERCEPTIONS

The processing industries generate a range of often contrasting views and perceptions. For some, they represent places of work or future employment where people can earn a living or more broadly putting money into the local economy which will support the breadth of shops and other service infrastructure. Many people working in the industries or living in the towns where they are located are also proud of the goods and products which these industries create, many of which are eagerly consumed by wider society.

Some processing plants, such as sewage works, are clearly essential public amenities, though few want them in their immediate neighbourhood for aesthetic, environmental and local character reasons. However, others may perceive the material presence of processing industries as more generally unattractive and a cause or risk of various forms of pollution, whether sensory, physical or both.

Conservationists often oppose the construction of reservoirs for their potential impact on local flora and fauna, however among the wider public, reservoirs can be highly valued for the space they offer for recreation, tourism and leisure activities, often providing water sport facilities for wind surfers, canoeists, water skiers, anglers and yachtsmen.

RESEARCH, AMENITY AND EDUCATION

The past and ongoing reliance of many processing industries on the coast and sea for their materials supply and products distribution networks have often been overlooked, yet this dependence has led to many traces of these industries now forming highly distinctive parts of the coastal landscape and seascape for much of the country.

As they make such a contribution to their areas' distinctiveness, some features in this Character Type, such as mills, salterns and limekilns, may well be appropriate for wider public presentation in local visitor and tourist information resources as foci for raising awareness about local character and its development to the present.

The amenity potential of coastally-situated reservoirs is also extensive for fishing and water sports as well as areas of natural beauty and wildlife havens.

CONDITION AND FORCES FOR CHANGE

The condition of coastal processing industrial remains varies considerably from almost total destruction to excellent preservation. Where modern processing plants become redundant, they are generally quickly cleared and re-presented as areas ripe for new development. Historic coastal remains from these industries are prime targets for public-awareness initiatives in the context of the forthcoming coastal access requirements from the Marine and Coastal Access Act 2009. This access will need care in its routing to avoid increasing visitor erosion on surviving features.

Former processing industrial sites are often classed as 'derelict land' if remains are still present or, if recently cleared as noted above, as 'development land'. In either case, it is usually subject to expanding housing and industrial developments, though liaison with the relevant heritage planning advisers is needed to conserve and/or record earlier features where they still survive.

RARITY AND VULNERABILITY

In terms of rarity, processing industries exist, of course, where their necessary resource supply exists: for many such industries, that supply is ship-borne and their distribution is therefore coastal. In some cases that distribution may be further skewed by proximity to the land-based resources most costly to transport or to the chief market which the industries supply, hence for example the concentrations of large

complexes of processing industries along the Thames and Mersey estuaries near their markets in greater London and in the Merseyside and Manchester conurbations.

In terms of vulnerability, raising awareness of the roles and unique values of our coastal industrial processing remains in England can make them better understood as an integral part of the cultural legibility of their land and seascapes, a legibility which can be handed on to future generations.

PUBLISHED SOURCES

Appleton, J, 1929. Iron and Steel Industry of the Cleveland District, *Economic Geography* **5**, 308-19

Ashmore, O, 1982. *The Industrial Archaeology of North-West England*, Manchester: Manchester University Press

Baker, J, 1984. *Sunderland Pottery*, Wiltshire: Thomas Reed Publications

Department for the Environment Industry Profile, 1995. *Sewage Works and Sewage Farms*, Ruislip: Department for the Environment Industry Profile

Draper, J, 1984. *Post-Medieval Pottery 1650-1800*, Buckinghamshire: Shire Publications Ltd

Frank, S, 1982. *Glass and Archaeology*, London: Academic Press

Gaimster, D, 1997. *German Stoneware 1200-1900. Archaeology and Culture History*. London: British Museum Press

Gesner, P, 2000. *Memoirs of the Queensland Museum. Cultural Heritage Series*. Brisbane, Australia: Queensland Museum

Hobsbawm, E, 1999. *Industry and Empire*, London: Penguin Books.

Isham, K, 2000. *Limekilns and limeburners in Cornwall*, St Austell: Cornish Hillside Publications

Rowe, P, 2000. *Industrial Archaeology in Hartlepool*, Hartlepool: Tees Archaeology

WEBSITES

http://www.nwl.co.uk/

http://www.nationalglasscentre.com/

http://www.englandsnortheast.co.uk/

1.1.2.4 Character Type: Shipping Industry

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Shipping Industry includes the following Sub-types:

- Boatyard
- Shipyard
- Commercial shipping route

This Character Type refers to areas dominated by activity relating directly to the non-recreational use, maintenance, storage and administration of shipping.

A 'Boatyard' is a place where boats are built and stored (http://thesaurus.english-heritage.org.uk).

A 'Shipyard' is a place where boats or ships are built or repaired (http://thesaurus.english-heritage.org.uk).

A 'Commercial shipping route' refers to a route regularly used by ships engaged in commerce or trade. This may be defined by usage or in some areas, formally defined

by regulation. It may be distinguished from broader 'navigation routes' by its specific or overwhelming association with commercial shipping as opposed to naval, recreational or ferry traffic.

The shipping industry has a substantial direct socio-economic impact for today's society. It's impact as a trade facilitator across all sectors of the economy is huge but viewing the industry in more specific terms, recent statistics have shown that the shipbuilding and repair industry employs about 25,000 people (2004 statistics, Annual Business Inquiry (ABI) 2005). Strong competition from Eastern Europe and the Far East has made commercial shipbuilding a highly challenging market for European shipyards, and there are few remaining large English shipyards operating in the commercial sector.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type include:

- docks
- basins
- wrecks
- wharfs, quays, jetties and slipways
- warehouses, offices, depots and travelling cranes
- dockworkers cottages
- specifically associated transport systems (such as railways, roads, tramways)

Docks are places to load and unload goods and supplies as well as areas to undertake ship repair and maintenance. Wooden ships required frequent attention to the caulking between the planks. In the days before wire rigging, the heavy hemp rope needed regular adjustment and replacement. Dry docks are particularly suitable for ship repair as ships can be floated in on high tide and propped in position. When the tide falls, the dock gates are closed and the ship is left fully accessible and dry for work to be carried out. Constant wear and tear on wooden hulls meant a steady demand for dry dock facilities (White 2004, 96).

Evidence for prehistoric and early medieval vessels in England is sparse. This is primarily due to the perishable nature of the materials from which these vessels were constructed. It is believed that log boats (canoes made from hollowed out tree trunks) and hide boats were probably very common, and used during early periods as ferries, fishing boats, trading or war vessels (Friel 2003: 22; McGrail 2001). The remains of large Iron Age log boats have been found in Poole Harbour and at Hasholme, East Yorkshire. They continued to be used well into the medieval period and one from a tarn in West Yorkshire has been dated to the late 14th century (McGrail 2006, 32-4). Hide boats have probably been in use from the at least the Bronze Age but due to their nature survival is rare. There is documentary evidence of their use in the seas of North West Europe from writers of the Classical period onwards and a gold model boat of the 1st century BC from Broighter, Ireland is thought to represent one of these craft (McGrail 2006, 30-2). Their use continued, particularly in the western parts of the British Isles, well into the medieval period and they are still being built and used in Wales and Ireland to the present day.

Although ships and boats made from wooden planks have a better survival rate than log or hide boats, few early medieval examples have been found in England. Important examples of early plank-built vessels include the Dover Bronze Age boat dated to c. 1300 BC. It was found in freshwater sediments with associated peat layers about 30m from the course of the modern River Dour. A long sequence of channel-narrowing puts the original context of the Bronze Age boat in a riverside location, with direct access to the sea. This indicates some use of the area as a refuge or landing place for that period

(for further details see Clark 2004). Other plank-built Bonze Age boats include those found in the Humber such as Brigg and Ferriby.

One of the most famous examples of an early medieval boat is the Sutton Hoo ship, the ghost traces of which were discovered in an Anglo-Saxon burial mound near Woodbridge (Suffolk) (Friel 2003, 24). Other medieval ships include the Magor Pill and Newport ships from Wales but English examples are rare.

The location of shipbuilding sites seems to have been rather haphazard in England's medieval landscape. The sites themselves were rudimentary, although ships were being built in simple docks from at least the 1330s (Friel 2003). Accounts from between the late 13th and early 15th centuries state that shipbuilding was still based on clinker construction (Friel 2003; McGrail 1998, 2001).

Changes in European shipping during the 15th century were influenced by the skeleton-built Portuguese caravels. Skeleton construction involved nailing hull planks to a pre-erected skeleton of strong frames; the planks did not overlap, but were laid against each other, giving the hull a smooth exterior (Friel 2003; McGrail 1998, 2001). Other 15th century shipping changes included the introduction of two- and three-masted ships and a decline in the number of large ships. The latter may have been due to changes in the demand for goods being transported. Merchant ships of more than 100 tons were uncommon in England until the late 16th century, when they were constructed for long-distance bulk trade and war (Friel 2003; McGrail 1998, 2001).

The rapid development of the shipping industry and trade in the middle decades of the 18th century was linked to increased competition among the expanding European powers as well as processes such as capitalism and colonialism (see Davis 1962; Dellino-Musgrave 2006; Staniforth 2003). The English shipping industry underwent a particularly rapid development following the Seven Years War against France (1756-63), and the rate of English naval construction rapidly increased (see Parry 1971, 113-129). Before that war, French warships were considered to be better designed and faster than the English ships (see Lavery 1983; Parry 1971, 119). Subsequently, the English shipping industry promptly flourished since they based their ship designs on those of the French, the English becoming a maritime power from the end of the 18th century onwards. By contrast, after the declaration of the Seven Years War, the French shipping industry remained steady, and after some time, declined.

During the mid 19th century, technological and economic progress gained momentum with England as a world leader in the development of steam-powered ships and railways, and later the internal combustion engine and electrical power generation. , England became one of the leading industrial powers of the 19th century, due in no small part to the strength of its shipping industry (Hedges 1989, 5). During this period, steamships gradually replaced sailing ships for commercial shipping. Many new demands on rapid freight transport were made which could be more easily met by steam-powered vessels, especially from the 1840s when iron hulls and the screw propeller were introduced (Hobsbawm 1999; Pearsall 1985).

In the 1900s, the internal combustion engine and gas turbine replaced the steam engine in most ship applications. Trans-oceanic travel, transatlantic and transpacific, was a particularly important application, with steam powered ocean liners replacing sailing ships, culminating in the 'Superliners' such as those of the White Star Line, including the unfortunate *RMS Titanic*.

The impact of U-boats (military submarines) operated by Germany during the two World Wars underlined the importance of shipping to England's economic sustainability. In practice, U-boats were most effectively used in an economic-warfare role, enforcing a naval blockade against enemy (in this case, British) shipping. Remains of several U-boats are present in English waters, in particular on the east coast.

Although the historic importance of sea travel for passengers considerably decreased during the 20th century due to the development of road transport and especially

aviation, it is still very effective for short trips and pleasure cruises. Sea transport remains the largest carrier of freight in the world, most of it international rather than between domestic ports.

VALUES AND PERCEPTIONS

Historically, the development of new technologies in shipbuilding has been perceived as a means of increasing the speed, efficiency and volume of links with distant regions, places and people.

Shipbuilding has inspired many artists and writers but beyond that, the imprints that the shipbuilding industry has left on today's landscape are widely and often proudly accepted and valued as reflecting their areas' part in England's long maritime heritage.

Today, the shipping industry is commonly perceived as a means for leisure and recreation, with many overlooking its still-vital role in facilitating the country's trade. Shipping can also be perceived as an expanding global business, offering the opportunity for commercially competitive shipping industries to share in this growth providing significant inward investment opportunities and, principally, wider economic benefits in England.

RESEARCH, AMENITY AND EDUCATION

Shipbuilding traditions have recently been explored as a social product (Adams 2003, forthcoming), helping to contextualise shipbuilding within its much broader societal roles at national and regional levels.

This Character Type contains a strong amenity value linked to recreational and leisure activities such as cruises and sailing. Related amenity and educational values can be seen through the wide range of museums and historic shipyards (e.g. Portsmouth Historic Shipyard and the National Maritime Museums at Greenwich and Falmouth). In addition the study of shipbuilding, associated infrastructure and wreck sites offers a wealth of cross-curricular opportunities incorporating science, maths, English, history and environmental studies.

CONDITION AND FORCES FOR CHANGE

The shipbuilding industry in England is widely expressed through its components such as docks; basins; wrecks; wharfs, quays, jetties and slipways; warehouses, offices, depots and travelling cranes; dockworkers' cottages; and specifically associated transport systems (such as railways, roads, tramways). At some locations, these components have now been transformed into marinas or commercial centres, Albert Dock (Liverpool) being an example (http://www.albertdock.com/).

The impact of this Character Type has been mainly economic, providing employment, income resources and providing transport for the necessary import/export needs of manufacturing industry in England.

RARITY AND VULNERABILITY

This Character Type is strongly linked to the economic vitality major ports such as London, Liverpool, Southampton and Felixstowe. Its impact is seen on the links to international trade and the British Empire with many British ships having sunk overseas.

Once redundant, former shipbuilding areas form prime development land open transformation to marinas, commercial centres or even mixed use, retail, and residential areas.

Today, the shipping industry could be seen as an expanding global business and the opportunity for commercially competitive shipping industries. This potential growth offers significant inward investment opportunities as well as wider economic benefits in England. Commercial shipping routes may be subject to change as many of England's east coast harbours are being extensively developed. The largest of these is the London

Gateway project but there is also development underway or planned at Felixstowe, Harwich and Great Yarmouth.

PUBLISHED SOURCES

Adams, J, 2003. *Ships, Innovation and Social Change. Aspects of Carvel Shipbuilding in Northern Europe 1450-1850*, Stockholm: Stockholm University

Adams, J, 2013. *A Maritime Archaeology of Ships*, Oxford: Oxbow Books

Clark, P, ed, 2004. *The Dover Bronze Age Boat*, Swindon: English Heritage

Davis, R, 1962. *The Rise of the English Shipping Industry in the Seventeenth and Eighteenth Centuries*, London: MacMillan & Co. Ltd

Dellino-Musgrave, V, 2006. *Maritime Archaeology and Social Relations, British Action in the Southern Hemisphere*, New York: Springer Press

Friel, I, 2003. *Maritime History of Britain and Ireland*, London: The British Museum Press

Hobsbawm, E, 1999. *Industry and Empire*. London: Penguin Books

Lavery, B, 1983. *The Ship of the Line*. London: Conway Maritime Press

McGrail, S, 1998. *Ancient Boats in North West Europe*, London: Longman

McGrail, S, 2001. *Boats of the World*, Oxford,:Oxford University Press

McGrail, S, 2006. *Ancient Boats and Ships*, Malta: Shire

Parry, J, 1971. *Trade and Dominion. The European Overseas Empires in the Eighteenth Century*, London: Weidenfeld and Nicolson

Pearsall, A, 1985. Steam enters the North Sea, in A Bang-Anderson, ed, 1985 *The North Sea. A Highway of Economic and Cultural Exchange. Character-history,* Norway: Norwegian University Press, 195-216

Staniforth, M, 2003. *Material Culture and Consumer Society, Dependent Colonies in Colonial Australia*. New York: Kluwer Academic/Plenum Publishers

WEBSITES

http://www.bbc.co.uk/nationonfilm/topics/ship-building/

http://www.portoftyne.co.uk/default.aspx

http://www.abports.co.uk/Our_Locations/Hull_Goole/

http://www.ferribyboats.co.uk/

1.1.3 Broad Character: Fishing

1.1.3.1 Character Type: Fishing

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Fishing includes the following Sub-types:

- Bait digging
- Bottom trawling
- Shellfish collection
- Fixed netting
- Hand netting
- Longlining
- Seine netting

- Drift netting
- Pelagic trawling
- Demersal trawling
- Fishing ground
- Potting
- Shellfish dredging
- Fish market
- Fish warehousing
- Fish trapping

The 'Fishing' Character Type refers to areas of the sea, estuaries and rivers whose character is dominated by activities concerned with the capture or gathering of wild fish and unfarmed shellfish stocks by various methods such as trawling, netting, trapping, potting, dredging and collection by hand. This includes directly associated landing, marketing, processing and distribution facilities.

Bait digging refers to areas whose character is dominated by regular digging to acquire bait for fishing by various methods. Generally found in estuaries, sandy and rocky foreshores.

Bottom trawling refers to commercial fishing involving trawling the lowest levels of the water column and/or the surface of the sea floor, the demersal and benthic zones respectively. These methods often result in disturbance to the sea floor itself. The most widely used methods are otter trawling and beam trawling.

Otter Trawling uses funnel-shaped trawl nets, with sides extended forward to form wings to guide fish into the funnel. The net is held open horizontally as it moves through the sea by wooden or steel 'otter boards' while floats raise and open the upper edge of the net mouth. Weights distributed along the lower edge (ground rope) ensure good contact with the sea-floor and disturb the fish into position for catching in the net.

Beam-trawling uses a rigid beam of wood or metal across the net mouth. At each end of the beam are steel plates called beam-heads fitted with stirrup-shaped shoes that keep the beam slightly raised from the sea-floor and hold open the net mouth. The net funnels out behind the beam, with chains arranged in front of its lower edge to disturb the sea floor. When the trawl is in motion, the disturbed fish are caught in the net as it passes. This fishing method is widely used by fishermen for catching 'flat fish' species; however the method has also been accused of causing major ecological damage from sea-floor habitat disturbance and its indiscriminate by-catch.

Shellfish collection refers to an area of regular commercial collection by hand or hand-held tools, of naturally-occurring shellfish stocks for food, bait (if dug for bait, the 'Bait digging' Sub-character Type will be more appropriate) or other products. This does not include the collection of farmed shellfish from artificial structures, for which 'Shellfish farming' under 'Aquaculture' is more appropriate.

Fixed netting refers to areas of commercial fishing by fixed net methods, sometimes also termed set netting, which cover several detailed netting methods using gill nets, tangle nets or trammel nets. It refers to netting held stationery rather than being towed by a vessel or allowed to drift in the current. The nets hang vertically in the water column, generally in the range 50-200m long and are used singly or as a series joined end to end. Floats are attached to a headline and they are usually anchored by lead weights along a footrope but in shallow water they may be fixed to posts or other suitable objects driven into the seabed. The footrope is designed to rest on or just above the seabed. Fish are caught either by gilling or entanglement. Fixed netting is largely confined to inshore areas.

Hand netting refers to areas of fishing using hand-held nets worked by an individual fisherman. Regional variations include haaf netting on the Solway and Lune estuaries, lave netting on the Severn, and dip netting on the Parrett. All consist of a rectangular frame from which a net is suspended. A haaf net has a middle leg which extends for carrying the frame (beam) and to tip it to trap fish; a lave net consists of a hand-staff which is held in one hand and a headboard with the other, whilst the fingers are entwined in the bottom of the mesh feeling for the fish. The haaf net is positioned in front of the fisherman, to face the run of the water. The most common method is to stand in shallow estuary waters during the ebb tide. The fisherman faces the outgoing tide holding the net to catch salmon. Haaf-netters sometimes fish in a line, in small numbers or alone depending on the ground. Includes local variants such as 'Flood Beam' or 'Marsh Haaf'. The lave net is used at low spring tides in flat and calm conditions. Dip nets, larger versions of the child's rock-pool net, are used around the Severn Estuary and on the River Parrett, to catch elvers (young eels).

Longlining refers to commercial fishing using long-line methods. Longlining involves setting out in the water column a fishing line, often several kilometres long, from which shorter lines called snoods are spaced at intervals and carry baited hooks. The lines may be set vertically or horizontally, with an anchor and marker buoy at each end, at various levels in the water column depending on whether the target species are demersal or pelagic. The size and types of fish caught are also determined by the hook size and the type of bait used. Longline fishing in the UK is typically engaged in by small inshore vessels, 10m or less, generally operating on grounds near their home port.

Seine netting refers to commercial fishing using seine nets. A seine net is a long net that hangs in the water column with floats along the upper edge and weights along the bottom. The ends of the net can be drawn together to encircle and herd a school of fish, and then hauled in, usually by a fishing vessel in modern commercial fisheries but, historically in shallow inshore waters, by hand too. Two main types of seine nets are in use: purse seines and Danish seines. Purse seines have a drawstring running through rings along the lower edge, which closes the floor of the net to prevent the fish from escaping as it is hauled in. Danish seines use a conical net anchored to the sea floor at one end; wires attached to wings at the other end are towed around a shoal by a vessel, herding the fish into the net for hauling in.

Drift netting refers to areas of commercial fishing using large nets that drift in the water, moved by currents and lacking any fixtures to keep them in place. These are generally used for pelagic or migratory species. Drift nets are rigged in a straight line to form a curtain in the water. Fish swim into the net and are trapped there by their gills.

Pelagic trawling refers to commercial fishing involving trawling midwinter levels of the water column, targeting the pelagic fish species, most commonly mackerel, herring or sprats in the UK. Large funnel shaped nets, held open at the mouth by floats and weights, are towed by one or two (pair-trawling) vessels. Net size varies considerably, up to 240m wide, as does the size of vessel operating such fisheries, which may be inshore or offshore.

Demersal trawling is a generalised term referring to the act of catching flat fish species that mainly live on or near the seabed through fishing methods that involve trawling the bottom of the sea and often results in the disturbance of the sea floor itself.

Fishing ground refers to an area regularly exploited for commercial fish and/or shellfish extraction, but within which the locations of actual fishing activity at any given time may vary, seasonally and over other temporal cycles according to the behaviour of the target species concerned and regulations governing their exploitation. Consequently the definition of fishing grounds will depend on several factors: the distribution and behaviour of the commercial fish species, fishery regulation at regional, national and international levels, and custom and tradition within the fishery concerned.

Potting refers to areas characterised by commercial fishing using pots and creels. Pots and creels are small portable traps set on the sea floor in coastal waters to catch a variety of crustacea and molluscs such as lobsters, crabs, cuttlefish, crayfish and shrimps. When baited, they are set on the sea floor singly or in lines with marker buoys at each end. There are many designs reflecting both target species and local tradition. Traditionally made from basketry but now usually of cord mesh over a metal and wooden frame, they generally have one or more funnel-shaped entrances allowing the prey species to enter but not leave. Potting grounds are rarely more than a mile offshore and in most parts of the country occur in areas of rocky sea-floor.

Shellfish dredging refers to areas characterised by the regular commercial collection of naturally-occurring shellfish stocks for food, bait or other products using a dredge towed behind a fishing vessel. In UK waters the target is usually scallops. Scallop dredges consist of a ruggedly constructed triangular steel frame and tooth-bearing bar, behind which a mat of linked steel rings is secured. A heavy netting cover joins the sides and back of this mat to form the bag in which the catch is retained. Scallops, which usually lie in sand or fine gravel, are raked out by the teeth and swept into the bag.

A fish market is a market where fish is sold (http://thesaurus.english-heritage.org.uk). This includes closely and functionally associated open areas, built structures, wharves, quays and distribution facilities.

Fish warehousing refers to an area characterised by buildings used specifically for the storage of fish or fish products. Such storage may relate to several aspects of the fishing industry, for example the storage of fish after landing and before auction or sale, or the cold storage of fish after sale. It includes closely and functionally associated transport and distribution facilities.

Fish trapping refers to areas characterised by the use of fish traps for the capture of naturally occurring fish stocks. Fish traps are permanent or semi-permanent structures, built or placed in rivers (freshwater or estuarine) or tidal areas and designed to catch fish as they move along in river currents or down the shore on the ebbing tide. Fish traps include stone, timber, basketry or framed-net structures, sometimes covering extensive areas with their funnel-shaped plans, concentrating trapped fish towards a collection point; in other cases, smaller structures are sited in strategic position along rivers or tidal channels, again designed to ensnare fish travelling along them. This Sub-type does not include temporary portable pots and creels which are repeatedly lifted and re-set at sea: the 'Potting' Sub-character Type covers areas dominated by that method.

The character of fishing in the open sea is similar to that of hunting and gathering in that it exploits its prey resources over extensive territories across which the areas of actual fishing activity will move, seasonally and over other temporal cycles according to the behaviour of the prey species concerned. Those territories: the fishing grounds, and the fishing methods which dominate within them, are defined and can be mapped according to several factors: the distribution and behaviour of commercial prey species, fishery regulation at regional, national and international levels, and by custom and tradition.

Fishing methods also vary considerably in their impact on marine and estuarine biodiversity and on the physical environment of the areas in which they operate producing, for example, clear differences between the ecological and physical imprints of pelagic trawling and those of bottom trawling.

Following implementation of the Marine and Coastal Access Act 2009, the Marine Management Organisation (MMO) controls sea fishing in seas around England. Its responsibilities include enforcement of sea fisheries legislation, licensing of UK commercial fishing vessels, sampling of fish catches, management of UK fisheries quotas, an advisory role and general liaison with the fishing industry.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Fishing is an ancient practice and has been an integral part of human activity since at least the Palaeolithic (c. 40,000 years ago). Historic features such as shell middens, discarded fish bones and cave paintings show that sea foods were important for survival and consumed in significant quantities. During this period, people lived a hunter-gatherer lifestyle and were, of necessity, nomadic (i.e. constantly on the move), though this would not preclude a regular cycle of repeated visits to favourable locations across an extensive territory. The coastal zone is an especially rich resource for the hunter-gatherer lifestyle and, due to post-glacial sea level rise, several early sites are now submerged (see Fischer 2004).

Since the end of the last glacial period *c*13,000 BP, many cultures around the world made the transition from nomadic hunter-gatherers to more sedentary farmers. With the new technologies of farming and pottery came basic forms of all the main fishing methods that are still used today (http://en.wikipedia.org/wiki/History_of_fishing).

One of the world's longest trading histories is the trade of dry cod, which commenced at least during the Viking period and probably earlier, and has therefore been practised for well over than 1000 years.

Fishing became a major industry in the medieval period in areas such as East Anglia, where the herring fishery was key and already established by the time of Domesday. This industry continued into the 20th century, despite several periods of decline The industry was based on small, localised fleets often launching off the beach. The medieval period also saw the further development by the English of the Icelandic cod industry following the Anglo-Danish Treaty of 1490 which eased restrictions on fishing in Icelandic waters.

Many of the English fisheries were in decline by the early 17th century as a result of competition from foreign vessels, especially the Dutch herring fleets. Foreigners were prohibited from fishing in all the fisheries off the coasts of England, unless they bought licences: the seas were no longer 'free' (Starkey *et al* 2003).

In the mid 18th century, trawling in English waters was mainly confined to stretches off the south west and south east coasts. Devon sailing trawlers worked out of Brixham and Plymouth, while Barking was the centre for craft trawling in the Thames approaches (Starkey *et al* 2003). The widespread introduction of bottom and beam trawling had a revolutionary impact on the fishing industry in England as a whole and Brixham's refined and improved trawlers became famous, influencing timber-built trawler design for fishing fleets across the world at that time. By the last quarter of the 19th century the most dynamic sector of the English fisheries was trawling in the North Sea.

At the beginning of the 1900s, gas powered boats were beginning to make an appearance, and by the 1930s, the row-sail boat had virtually disappeared. In the 1930s, the drum was created, allowing nets to be drawn in faster. Along with the faster gas powered boats, fishermen were able to fish in areas they had previously been unable to go into, thereby revolutionising the fishing industry.

During World War Two, navigation and communication devices, as well as many other forms of maritime equipment (e.g. depth-sounding and radar) were improved and made more compact. These devices became more accessible to the average fisherman, thus increasing their range.

During the 1960s, the introduction of fine synthetic fibres (e.g. nylon) in the construction of fishing gear marked an expansion in the commercial use of gillnets. The new materials were cheaper and easier to handle, lasted longer and required less maintenance than natural fibres. Nylon is highly resistant to abrasion; hence the netting has the potential to last for many years. This 'ghost fishing' is of environmental concern, however it is difficult to generalise about the longevity of ghost-fishing gillnets due to the varying environments in which they are used.

Historically, a huge diversity of fish species has populated the northern seas but fishing activity has tended to focus only on a limited part of that range, with two species in particular, cod and herring, being heavily exploited in North West Europe. Today, the North Sea is one of the world's most important fishing grounds. Major UK and international fishing fleets operate in the southern, central and northern North Sea, holding over 150 species of fish, 15-20 of which are of commercial value. One of the most characteristic fisheries in the North Sea is the mixed demersal fishery that targets cod, haddock and whiting in the central and northern parts of the region (see CEFAS 2001).

VALUES AND PERCEPTIONS

Modern fisheries are increasingly coming to the attention of the wider general public with a growing concern over falling fish stocks and unsustainable fishing practices. Modern perceptions of fishing are often related to the destruction of fish stocks and damage to the seabed and marine biodiversity in general. However, fishing still has a deeply engrained and traditional economic role for many coastal communities in England, even if its actual practice in now much diminished. It is greatly valued for the distinctiveness it affords such areas by both local communities and visitors alike, and for some it remains an important element in the local economy.

RESEARCH, AMENITY AND EDUCATION

There is considerable potential for further research into the history of fishing, in particular its early development and the various catching, storing and processing techniques employed. Such research has much potential to inform strategies for sustainable fisheries and the marketing of their products, utilising the historic character and the distinctiveness of place attaching to such fisheries to complement the identification of patterns, trends and materials used. Much potential for socio-economic research on the fishing industry past and present also exists: for the present and future, the ability to conduct such research effectively will rest on the collection and availability of more detailed data than hitherto on methods used, days at sea, crew numbers, catch and by-catch species and quantities.

Archaeological finds associated with wrecks, inshore fishing and coastal potting areas will further inform a fuller understanding of the character and history of this industry.

CONDITION AND FORCES FOR CHANGE

One of the main forces for change regarding this Character Type relates to sustainability issues. In general, there is more knowledge about the fishing practice rather than the location of specific areas of activity. Some fishing practices will impact on the historic character of an area more than others. For example, trawling methods have a more intrusive impact on the seascape than pelagic netting and long-lining methods. The material evidence left by trawling activities includes trawl scars on the seabed itself.

The condition and drivers for change affecting historical aspects of the character of an area include, for example, pressures from the tourist industry on historic fishing settlements including developments such as hotels, marinas, caravan parks, and their associated roads and services. Economic and environmental pressures on the present fishing industry addressing issues of sustainability also need to be taken into account.

To date the impact of fishing activity on historic features has received relatively little study and has not been fully quantified. However, fishing has had large-scale character impacts on coastal settlement patterns and forms across the country, strongly influencing their embedded historic character in ways that their local communities and visitors value highly.

RARITY AND VULNERABILITY

Traditional fishing practices such as long-lining have been declining since the advent of more intensive trawling. Generally, fisheries are in a period of retrenchment and

quotas. Restrictions on fishing grounds are impacting on the scale, range and economic sustainability of the present industry.

Continued control over exploitation of fish stocks is necessary to enable their sustainable management, with European Union (EU) and UK reforms and measures progressing towards that end. This has considerable implications for the people whose livelihoods depend on marine food resources and on the character of places that accommodate those livelihoods. Regulation aimed at the sustainable harvesting and greater conservation of wild fish stocks may well alter the future balance between fishing and aquaculture in providing fish and shellfish protein, and the methods and species used in aquaculture.

Understanding historic fishing practices and their effects on the fishing resource may contribute to the long-term sustainability of sea fisheries. Consumer pressure might also encourage more sustainable fishing practices and give greater market value to fish caught using what are perceived as locally distinctive and 'traditional' methods, especially if their sustainability can be added to the marketing equation.

PUBLISHED SOURCES

CEFAS. 2001. *North Sea Fish and Fisheries: Strategic Environmental Assessment - SEA2 Technical Report 003*, CEFAS on behalf of DTI

Fischer, A, 2004. Submerged Stone Age - Danish examples and North Sea Potential, in N Flemminmg, ed, 2004, Submarine Prehistoric Archaeology of the North Sea: Research Priorities and Collaboration with Industry, *CBA Research Report* **141**, England: English Heritage/Council for British Archaeology

Starkey, D, Reid, C, Ashcroft, N, 2003. *England's Sea Fisheries: The Commercial Sea Fisheries of England and Wales since 1300*, London: Chatham Publishing

WEBSITES

http://www.northseatrail.co.uk/

http://www.jncc.gov.uk/

http://www.bmapa.org/

http://en.wikipedia.org/wiki/History_of_fishing

http://ec.europa.eu/fisheries/index_en.htm

1.1.3.2 Character Type: Aquaculture

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Aquaculture includes the following Sub-Character Types:

- Fish farming
- Shellfish farming

The 'Aquaculture' Character Type relates to the commercial cultivation of fish and shellfish populations under controlled conditions which are often, but not always or wholly, enclosed from wild stocks. It includes the raising of saltwater and/or freshwater species and may occur in locations inland, in rivers (freshwater or estuarine), tidal areas or in fully marine situations. Under 'Aquaculture', the main Sub-types, 'Fish farming' and 'Shellfish farming' generally involve different methods, locations and material features.

Fish farming refers to areas characterised by the commercial cultivation of fish populations under controlled conditions. Fish farms may be sited inland or coastally located artificial ponds, or in rivers, estuaries or the open sea, and they may be enclosed to varying degrees from wild fish stocks in tanks, cages or nets. The Sub-type

includes closely and functionally associated management, storage and distribution facilities.

Shellfish farming refers to areas characterised by the commercial cultivation of shellfish populations under controlled conditions which are sometimes, but not always, enclosed from wild stocks. Shellfish farming includes oyster beds, mussel beds and cockle beds, which are 'seeded' and managed over several seasons until they are big enough to harvest. Structures used at such farms to provide additional surface area for shellfish attachment include arrays of trestles, racks and poles. The Sub-type includes closely and functionally associated management, storage and distribution facilities.

The commercial cultivation of fish and shellfish populations under controlled conditions (cockles in particular) is popular to supply a broad range of cooking traditions now popular in England. Cockles still collected, as they have been since time immemorial, by raking them from the sands at low tide. Many of the cockles sold in England are from the Thames estuary. In some parts of England, cockles are sold freshly-cooked as a snack (e.g. Essex).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type include:

- Shellfish farms
- Fish farms
- Oyster beds
- Fish quays and wharfs

The exploitation of oysters has a long history in England. Prehistoric shell middens containing oysters are known around the country, the oysters collected with other shellfish by groups of hunter gatherers exploiting the rich coastal resources. Gathering oysters was probably quite common in coastal areas at this early period but prehistoric evidence of oyster 'farming' is lacking and the evidence for oyster consumption is limited to shell midden contents, such as those dating to the Mesolithic period at West Voe, Shetland (Melton and Nicholson 2004). They were probably a subsistence food. Coastal areas would have been the most productive in Mesolithic England due to their relative abundance of food, which would almost certainly have included oysters (Hunter and Ralston 1999). Historical reference to the exploitation of existing natural oyster beds in England occurs during the Roman occupation (Eyton 1858). Oyster shells have been found in many of the English Roman villas, including Fishbourne and Barton Court Farm (Potter and Johns 1992). Oyster beds on the Kentish Flats have been used since Roman times and the town of Whitstable (Kent) is still particularly noted for its oyster farming. By the 18th century, oyster fishery was certainly flourishing in England (Whitfield 2005).

Physical remains of oyster beds are notoriously difficult to date, although it is likely that most archaeologically recorded English examples are medieval or post medieval (Hegarty and Newsome 2005, 86). A peak in oyster consumption was observed in the mid 19th century when oysters were a common food for the poor.

Fish farming as a distinctly maritime-related activity relevant to HSC is relatively limited in extent nationally. For example there are currently an estimated 55 aquaculture businesses in south west England, but most of these are freshwater fish farms. Parts of Langstone and Chichester Harbours which are designated as a sea bass nursery area and important spawning ground for demersal fish (Hampshire County Council, 2010).

VALUES AND PERCEPTIONS

Modern aquaculture is increasingly coming to the attention of the wider general public in various ways. For some, fish farming is seen as a potential answer to unsustainable fishing of the wild resource, while for others there are significant outweighing concerns

over man's ability to control chemical and nutrient pollution from fish farms and the potential for genetic mixing of farmed fish with wild stocks.

However the shellfish-farming side of aquaculture is recognised as having a very long tradition in some areas and that form of aquaculture is still deeply engrained in the perceptions and economy of many communities, as in the case of Whitstable oysters noted above. As such, it is valued for the distinctiveness it affords these areas and as an important element in the local economy.

RESEARCH, AMENITY AND EDUCATION

Overall, the lack of systematic investigation into the archaeology of coastal shellfish fisheries has been identified in the past as a serious omission and a weakness in archaeology (Fulford *et al* 1997). This is being addressed to some extent by the Rapid Coastal Zone Assessment Surveys (RCZAS) and the National Mapping Programme (NMP) which have begun to identify such features. There is considerable potential for further research into the history of aquaculture, in particular its early development and the various techniques employed from catching to processing.

Further research, being undertaken by the Common Fisheries Policy (CFP), is also taking place on the current fishing industry addressing socio-economic impacts (http://ec.europa.eu/fisheries/cfp_en.htm).

From an educational perspective, issues of over-exploitation of fish stocks are helping raise public awareness of sustainability issues surrounding this Character Type.

How we meet society's demands for protein and in particular from fish and shellfish resources, couple with the practicalities, logistics and issues associated with the different types of aquaculture and its conflicts and compromises with estuarine and marine conservation and development, provides an interesting cross-curricular educational case study.

Paintings and historic photographs relating to this Character Type also have a valuable role to play both in research and in producing attractive educational resources to raise public awareness about the history and development of aquaculture.

CONDITION AND FORCES FOR CHANGE

Shellfish remains a popular foodstuff and much shellfish collection is still undertaken utilising traditional methods (i.e. by hand) and/or by being sucked up by a machine similar to a large vacuum cleaner, the latter having a more intrusive impact on the seascape. However pressures on the naturally occurring resource may produce an increase in more controlled shellfish farming to meet demand. Recent research has shown that global warming is likely to uncouple and alter the phase relationship between temperature and photoperiod (the period of time per day that an organism is exposed to daylight) and this is likely to have significant consequences for the reproduction of shellfish. Although this is unlikely to lead to extinction, it may cause species to disappear completely from particular areas. However, this will depend on speed of adaptation in relation to climate change and the degree of mixing between populations across the range of species (Lawrence and Soame 2004).

Other economic and environmental pressures on the present fishing and aquaculture industry addressing issues of sustainability also need to be taken into account. Although it concerned naturally occurring shellfish resources, health and safety aspects of the shellfish industry came to the fore after over 20 Chinese cockle-pickers were drowned in Morecambe Bay on 2004. Shellfish farming is also vulnerable to economic pressures on its export trade from increasing continental shellfish stocks and poor export prices. Fish farming also raises environmental concerns over abilities to control pollution from nutrients and disease-control chemicals from fish farms and the potential for genetic mixing between farmed fish and wild stocks.

Aquaculture has had large-scale character impacts on coastal and estuarine settlement patterns and forms as well as presenting visible material remains on the foreshores and

estuaries of some areas. It provides a strong and thriving aspect of the locally distinctive historic character of such places.

The industry underwent regulatory change as, under the Marine and Coastal Access Act in 2009, when the Sea Fisheries Committees were replaced by Inshore Fishery Conservation Authorities (IFCAs), with a differing membership and differing objectives.

RARITY AND VULNERABILITY

Traditional and long-established shellfish farming methods (i.e. by hand) and/or by the use of a suction machine are still being used today.

Continued control over exploitation of fish stocks is necessary to enable their sustainability, with European Union (EU) reforms and measures progressing towards that end. This has implications for the people whose livelihoods depend on marine food resources and on the character of places that accommodate those livelihoods. Regulation aimed at the sustainable harvesting and greater conservation of wild fish stocks may well alter the future balance between fishing and aquaculture in providing fish and shellfish protein, and the methods and species used in aquaculture. Understanding historic aquaculture practices and their long-term sustainability may offer valuable inputs to these future trends.

PUBLISHED SOURCES

Davidson, P, 1976. Oyster fisheries of England and Wales. *Laboratory Leaflet* No. **31**. Ministry of Agriculture Fisheries and Food (MAFF), Directorate of Fisheries Research

Eyton, T, 1858. *A History of the Oyster and the Oyster Fisheries,* London: Jan Van Voorst

Franklin, A, 1972. The cockle and its fishery: *Laboratory Leaflet No.* **26** *(New Series)*. Ministry of Agriculture, Fisheries and Food (MAFF) Fisheries Laboratory

Fulford, M, Champion, T, Long, A, eds. 1997. *England's Coastal Heritage: A Survey for English Heritage and the RCHME. RCHME/EH Archaeological Report* **15**, London: EH/RCHME

Hampshire County Council, 2010. Hampshire County Integrated Character Assessment 2 *Status: Draft March 2010* South East New Forest Coastal Plain

Hegarty, C, Newsome, S, 2005. *The Archaeology of the Suffolk Coast and Intertidal Zone. A report for the National Mapping Programme*, Suffolk County Council and English Heritage

Hunter, J, and Ralston, I, 1999. *The Archaeology of Britain: An Introduction from the Upper Palaeolithic to the Industrial Revolution*. England: Routledge

Lawrence, A, and Soame, J, 2004. The Effects of Climate Change on the Reproduction of Coastal Invertebrates, *The International Journal of Avian Science* **146**, 29-39

Melton, N, and Nicholson, R, 2004. Hunter-gatherers in Shetland: Archaeological Investigations at West Voe, Sumburgh, *The New Shetlander* **229**

Pawson, M G, Pickett, G D, and Walker, P, 2002. The coastal fisheries of England and Wales, Part IV: A review of their status 1999–2000. *Science Series Technical Report* **116**. Centre for Environment, Fisheries and Aquaculture Science

Plumb, T W, 1996. *Fisheries intensity study, area 395, south east of Nab Tower, Solent*

Potter, T, and Johns, C. 1992, *Roman Britain*, London: British Museum Press

Utting, S D, and Spencer, B E, 1992. Introductions of marine bivalve molluscs into the United Kingdom for commercial culture — case histories, *ICES Marine Science Symposium*, **194**, 84–91

Walmslet, S A, and Pawson, M G, 2006, The Coastal Fisheries of England and Wales, Part V: a review of their status, 2005-6*, Cefas, Science Series Technical Report 140*

Whitfield, R, 2005. *Emsworth: A History*, England: Phillimore & Co Ltd

WEBSITES

http://www.northseatrail.co.uk/

http://www.jncc.gov.uk/

http://www.bmapa.org/

1.1.4 Broad Character: Ports and Docks

1.1.4.1 Character Type: Ports and Docks

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Port, Docks and Harbours include the following Sub-types:

- Dockyard (Civil)
- Wet dock
- Harbour
- Landing point
- Working pier
- Port
- Quay
- Breakwater
- Terminal building
- Warehousing
- Rope-making

This Character Type relates to areas dominated by the functioning of ports and docks, together with their harbours and directly port-related industry, features and imprints.

A 'Civil dockyard' is an area, often enclosed, in which ships used primarily for non-military activities are built and repaired, and where ships' stores are brought together (http://thesaurus.english-heritage.org.uk).

A 'Wet dock' is a built structure or group of structures enclosing an area of water which was impounded by lock gates to maintain water levels artificially, facilitating the loading, unloading, building or repair of ships.

Harbour is an area on the coast where ships can find shelter or safe anchorage. Harbours require features that provide shelter and a pool area large and deep enough to accommodate vessels at anchor. The necessary shelter and pool may be provided by unmodified topographic features or by artificial walls and breakwaters, while pools may have floors and access channels deepened by dredging. Where the dominant character of a harbour area's activity is governed by dedicated harbour-navigation administrative controls, the harbour may have been assessed as a 'Harbour pool' discussed in the 'Navigation' Character Type text.

A 'Landing point' is a place where vessels can land passengers and goods (http://thesaurus.english-heritage.org.uk).

A 'Working pier' is a raised platform, generally of iron or wood, supported on spaced pillars or props and projecting out into the sea and designed to facilitate the transfer of

cargo and/or passengers on and off shipping. They vary considerably in size and complexity, providing raised access over the sea from the shore to an adjacent position near or below MLW. Working piers incorporate landing points for shipping at their end and/or along their sides. They are distinguished from 'pleasure piers', whose function is primarily recreational and which are discussed in the 'Recreation' Broad Type and Character Type.

A 'port' is a settlement area that combines a harbour and terminal facilities at the interface between land and water transportation systems (http://thesaurus.english-heritage.org.uk).

A 'quay' is an artificial bank or landing place, largely of solid construction, built parallel to, or projecting out from, the shoreline to facilitate the loading and unloading of vessels (http://thesaurus.english-heritage.org.uk).

A 'breakwater' is a structure which protects a beach or harbour by breaking the force of the waves (http://thesaurus.english-heritage.org.uk). Breakwaters may be constructed entirely offshore at a strategic location or with one end attached to land. Commonly associated with ports and navigable river mouths, breakwaters often have subsidiary roles in helping keep harbours and river mouths free from silts and in carrying maritime safety structures, not least to warn of the presence of the breakwater itself.

A 'terminal building' is a building within a transport terminal, often associated with the registration and clearing of incoming and outgoing passengers or freight (http://thesaurus.english-heritage.org.uk).

'Warehousing' refers to an area, forming an integral part of a port, dock or harbour, which is characterised by buildings used for the storage of goods or merchandise (http://thesaurus.english-heritage.org.uk). Warehousing areas known to have been specifically associated with the fishing industry are discussed under 'Fish warehousing' in the 'Fishing' Character Type text. Warehousing located outside recognised port, harbour and dock areas and lacking any clear distinctive maritime character is not covered by HSC: it forms an aspect of relevance to HLC instead.

'Rope-making' applies to civilian areas associated with rope manufacture, including rope-walks, associated factories, storage and administrative buildings, structures and access areas. Where it is found in a military contexts it may form an integral part of a dockyard in which case, depending on the scale of characterisation, rope-making areas may be subsumed under the 'Naval dockyard' or 'Dockyard (Civilian)' Sub-character Types as appropriate.

Port areas involve artificial coastal or riverine facilities where boats and ships can load and unload. Ports often have cargo-handling equipment such as cranes and forklifts for loading and unloading of ships. Often, ports may have warehouses for storage of goods and a transport system for transporting goods inland (e.g. railway, road transport or pipeline transport facilities). Harbour pilots, barges and tugboats are frequently used to manoeuvre large ships in tight quarters as they approach and leave ports (http://en.wikipedia.org/wiki/Port). The presence of deep water in channels or berths, the provision of protection from the wind, waves and storm surges and access to intermodal transportation such as trains or trucks are critical to the functioning of ports.

Ports form the interface between land and marine transport and distribution systems. In that role they perform a range of functions: to receive ships; to transfer and accommodate cargo and people moving to and from ships; to provide a coastal distribution hub for various scales of hinterland; to provide dockyard maintenance and repair facilities, again at various scales, and to offer shelter from storms. Associated features include the necessary structures to ensure safe approach, entry to and landing at the port, such as breakwaters, harbours, quays, wharves. Harbour pilots, barges and tugboats are commonly used to manoeuvre large ships in tight quarters as they approach and leave ports. Many ports have maintained deep water channels and

berths: many of the aspects covered by the 'Navigation' Character Type are closely associated with ports. Ship maintenance, supply and repair facilities may be small in scale or enlarged to form enclosed dockyards. Transfer and reception of goods and passengers includes terminal facilities and closely associated car parks; in some cases also customs and immigration facilities. Ports usually include areas of hotel accommodation for passengers in transit and housing for workers servicing the port. Loading and unloading of goods requires storage and transfer areas: now often involving container storage and 'big sheds', but historically too, warehousing grouped around or behind the quays. Processing and manufacturing facilities from various industries are often located very close by, while some ports have specialist areas for landing and distributing fish, with characteristics relating to the 'Fishing' Broad Character Type. From their role as coastal distribution hubs, many ports also have extensive areas devoted to road and rail transport linking with their landward catchment and hinterland: sometimes a national one for the bigger ports.

Ports do not have an assured lifespan and may become redundant for many reasons. Rye (East Sussex) was an important English port in the medieval period, but sediment accretion and land reclamation have considerably altered the coastline and it is now 2 miles (3.2 km) from the sea. London, on the River Thames, and Manchester, at the head of the Manchester Ship Canal, were once important international ports, but changes in shipping and cargo-handling methods, notably the use of containers and larger ships, put them at a disadvantage (http://en.wikipedia.org/wiki/Port) to expanded and new container ports, for example, Felixstowe, Suffolk and the recently opened London Gateway complex on the Essex coast of the Thames Estuary.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type include:

- landing stages, wharfs, jetties, pontoons, slipways, terminals;
- port administration and regulation areas;
- slipways with cranes or ramps.
- cargo-handling equipment, storage facilities;
- custom areas, quarantine areas;
- pilot stations, small craft facilities;
- wrecks;
- lighthouses, batteries;
- rope-walks, factories and storage facilities;
- specifically associated transport systems (such as railways, roads, tramways).

Whilst seaborne traffic has been a strong element in British prehistory since the Neolithic period, it is only in the Iron Age that there is clear archaeological evidence for a port. Prior to this ships and boats are likely to have been dragged up onto sheltered beaches and mudflats, with any evidence from that likely to be in the form of coastal settlements and intertidal artefact concentrations. Mount Batten, a sheltered promontory in Plymouth Sound shows a sudden growth in metalworking and evidence for trade with west Cornwall, Dorset, and Brittany from the 8th century BC (Cunliffe 1988). Evidence for more permanent port facilities appear at Poole Harbour in the late 3rd century BC and at Hengistbury Head in the early 1st century BC in the form of jetties and a gravel hard adjacent to an inlet respectively (Parfitt 2004, 100).

During the Roman occupation, Poole Harbour continued to be a major civilian port and others were established or continued at Colchester, London, Rochester, Chichester, Bitterne (Southampton), Exeter and Gloucester (Mason 2003, 116). Military ports may also have been used by civilian traffic. These would all have had quays and jetties, warehouses, and administrative buildings.

Smaller native settlements with less substantial infrastructure will have existed around the coast. An example of one of these may be represented by Lellizzick, near Padstow on Cornwall's Camel Estuary, where up to 70 circular structures representing a multi-phase settlement spanning the Roman and Post-Roman periods shows evidence of trade with continental Europe throughout its lifetime. Boats would have been drawn up onto the sheltered beach immediately below the settlement. Similar arrangements may well have occurred at nearby Tintagel during the Post Roman period, where there is evidence of substantial trade with Latin Europe: 19th century photographs show beached vessels loading slate cargo at Tintagel Haven at that late date.

The first post-Roman English towns appear in the 7th and 8th centuries as settlement and centralized political control became more established. A significant number of these English towns were sea and river ports (Friel 2003, 25). The growth of ports was occurring at an international level, since ports trade with other ports. This period is marked by the development of settlements on both sides of the North Sea and the English Channel, with the Germanic word-element *wic*, meaning 'trading place', incorporated into their names (e.g. Runswick, Saltwick, Gippeswic (Ipswich), Hamwic (Southampton), Lundenwic (London), and Eorforwic (York)). These towns were mostly located on navigable rivers or in good coastal harbours (Friel 2003, 25-26).

Small hards, quays and landing places all around England were used as means for transferring goods since marine transport was faster and more efficient than via road. Some examples have been identified in the Hamble area (Hampshire) (see Hampshire & Wight Trust for Maritime Archaeology 2008, downloadable from http://www.hwtma.org.uk/index.php?page=project-3).

During the 8th century sea trade, and its prosperity, operated as a major fuel of economic growth in England. The growth of ports was generally stimulated deliberately by local rulers and, from early times, it seems that the government was involved in trade. The link between trade and wealth underpinned its regulation and protection.

Customs: the duties, tolls, or imposts imposed by the sovereign law of a country on imports or exports, are widely enforced at ports and landing places by customs agencies, establishments, or procedures. In England, customs duties were traditionally part of the *customary revenue* of the king, and therefore did not need parliamentary consent to be levied, unlike excise duty, land tax, or other forms of taxes.

In general, major ports and 'sea ports' handle ocean-going vessels, and 'river' ports are mainly related to river traffic, such as barges and other shallow draft vessels. Some ports on a lake, river, or canal have access to a sea or ocean, and are sometimes referred are 'inland ports'.

Quays or wharfs (structures built along or projecting from the shore of navigable waters) are necessary components of ports, allowing ships and other vessels to load and discharge cargo and passengers. Wharves may occur far upstream along rivers where they may be served by small craft which could get through any bridge arches, carrying coastal shipments or cargos off-loaded from bigger ships. 'Creeping waterfronts' are another characteristic commonly found at quays and wharfage. At their simplest, they are responses to silt built up against the waterfront, making it difficult for larger vessels to tie up: a new quay would be built further out to provide sufficient depth of water for these larger vessels. But the process of repeated waterfront expansion into the sea or a river estuary has often been by deliberate land reclamation to increase the area available for land-based port facilities and to enhance the vessel mooring capabilities. This process, infilling behind the new waterfront at each stage with rubble and often archaeologically-rich occupation deposits, has occurred since the Roman period, at London and York for example.

The East Anglian ports such as Great Yarmouth and Dunwich enjoyed a degree of eminence during the Middle Ages due to their proximity to the continent and the export needs of their hinterland's extensive textile industry. However economic, political and coastal processes combined between 1300 and 1600 to bring about the collapse and

decay of virtually all their international trade. In the 16th and 17th centuries, heightened threats of piracy also placed pressure on long distance trade from many smaller ports.

Perhaps the most dramatic downfall of a port is exemplified by Dunwich in Suffolk, East Anglia's premier port in the 11th century with a population of 3000. Between 1286 and 1326 the port and town was effectively destroyed following two major storms and a gradual silting of the harbour.

Despite being cut off from the sea, former ports could also retain their maritime influence as at Bridport, Devon. In the late medieval period the town was cut off from the sea, and its port relocated to West Bay, two miles away however it remained an important place for rope-making, and the industry continues today although mainly for use in the aviation industry and for sports facilities (Geology of the Wessex coast website - Bridport entry).

Piers (often used as landing places, promenades or to protect or create a harbour) are also essential components of ports. Piers range in size, form and complexity from simple lightweight wooden structures to massive solid structures extending over a mile out to sea. Lightweight piers are supported by widely spread piles or pillars allowing tides and currents to flow almost unhindered. In England, the term pier is principally associated with the image of a Victorian cast iron pleasure pier but many also function as port landing places and as harbour breakwaters.

The arrival of the railways established a number of ports including Felixstowe, Suffolk, which was founded in 1875 by Colonel George Tomline, creating the Felixstowe Dock and Railway Company. Felixstowe is now the largest container port in the UK and pioneered the construction of container ships and the development of roll-on/roll-off (Ro ro) ferries. Other established ports flourished in the railway age as freight and passengers were more easily transported to the coast. Major 20th century improvements in land freight transport also led to a massive decline in smaller ports' ability to compete.

Shipping and maritime trade through our ports are important elements of the UK economy and, in 2002, it was estimated that around 95% of the UK's international trade by volume was transported by sea (DTI 2002).

An important development in modern martime-based trade has been the containerisation of freight via re-usable steel containers of standardised dimensions that allow freight to be transferred from one transport system to another. Containerisation developed significantly in World War Two and through the 1950s after which its use spread globally with international standards adopted for containers in the 1960s and 1970s. Containerisation greatly reduced the expense of international trade but also dramatically charged the character of ports worldwide due to the mechanisation of container transfers, the development of deep-draft large container ships and the need for large port areas to store containers awaiting transfer. This led many existing major ports to become unusable so port facilities either expanded in other locations, for example, Felixstowe or were moved to a nearby location, as with the London Gateway (http://en.wikipedia.org/wiki/Containerization).

VALUES AND PERCEPTIONS

Ports and docks are perceived by visitors and locals in different, often conflicting, ways. They may be perceived as highly competitive commercial entities, commercial centres, or recreational places of iconic historic importance, as at Liverpool's Albert Dock. Ports and docks might be perceived as areas that allowed the connection of distant regions, places and people, with many and varied cultural influences. Liverpool's transatlantic port connections have been identified as one factor contributing to the city's early rise to prominence in the post-war popular music industry. Ports and docks have also inspired many artists and writers. However, major ports can also bring to mind historical aspects seen as less welcome, such as the slave trade and smuggling.

The historic roles of civil ports and docks in the building of England as major maritime trading force in the 19th and early 20th centuries is probably well recognised but the major modern container ports are generally not closely integrated with most people's common experience. Many people are probably now unaware of the enormous proportion of the goods they use that are brought into the country through our ports.

RESEARCH, AMENITY AND EDUCATION

In general, historical narratives about ports and docks as well as work on their associated coastal wrecks are well documented but relatively little work has yet been done to use this documentation to better understand the present form, character and distinctiveness of our current and historic ports and dockyard areas. That will provide the connections needed for these places' heritage to play its full role in informing planning and regeneration to future coastal settlements, in many cases still as ports, where their cultural legibility and distinctiveness remains.

In respect of the rapid changes in England's late 20th and early 21st century economy, while imports have maintained high levels, the rise of the financial services and service sectors have been accompanied by a rapid decline in manufacturing and hence exports, which has altered some ports. It is likely that much of the industrial imprint associated with ports will be a focus for redevelopment, leaving some urgency in recording their present features and assessing their roles and viability for the future.

Ports and docks also have a strong amenity value linked to recreational and leisure activities such as sailing. There is also potential for educational and outreach activities such as visits to harbours, local history courses in schools and in further education as well as a source of inspiration to historians and writers.

CONDITION AND FORCES FOR CHANGE

Ports and docks in England experienced many changes that created their long, complex and dynamic histories. Whilst many of these ports and docks still remain active (e.g. London, Liverpool, Southampton, Portsmouth), others have been reused for other activities such as commercial and recreational centres or, marinas (e.g. Liverpool's earlier waterfront docks declared a UNESCO World Heritage Site in 2004) with many others abandoned.

The late 20th and early 21st century economic changes noted above have had serious effects on the form and viability of many older or smaller ports, as has technological change, especially the general move to containerised shipping transport. These factors, and the rise of highly centralised land-freight distribution systems, have greatly favoured the building of modern container ports as wholly new sites with massive investment in new infrastructure to link them to their markets, as at the London Gateway container port which has recently been opened (http://www.londongateway.com/).

RARITY AND VULNERABILITY

Past and present ports of varying size and date are quite densely distributed around England's coastline. Many are well recorded historically but the greatest vulnerability probably lies in the redevelopment, and in some cases the withdrawal of port functions, from several of our current larger ports due to the changing factors discussed in the previous two sections. Their vulnerability can be seen in those port areas that have been transformed into commercial and recreational centres or marinas**.** Many of the specific issues relevant for consideration here are discussed in an English Heritage policy guidance note 'Ports: The impact of development on the maritime historic environment' (http://www.helm.org.uk/guidance-library/ports-the-impact-of-development-on-maritime-historic-environment/).

PUBLISHED SOURCES

Clark, P, ed, 2004. *The Dover Bronze Age Boat in context*, Oxford: Oxbow

Cunliffe, B, 1988. *Mount Batten Plymouth. A prehistoric and Roman port*, Oxford: Oxford University Committee for Archaeology Monograph **26**

DTI. 2002. *Human Activities in the SEA 3 Area*, DTI (now BERR)

Friel, I, 2003. *Maritime History of Britain and Ireland*. London: The British Museum Press

Hampshire & Wight Trust for Maritime Archaeology. 2008. *Recording Archaeological Remains on the River Hamble*, Southampton: Hampshire & Wight Trust for Maritime Archaeology on behalf of HLF, Southampton

Mason, D J P, 2003. *Roman Britain and the Roman Navy*, Stroud: Tempus

Parfitt, K, 2004. A search for the prehistoric harbours of Kent, in Clark, ed 2004

WEBSITES

http://www.meriam-webster.com/dictionary/pier

http://www.meriam-webster.com/dictionary/quay

http://en.wikipedia.org/wiki/Port

http://www.abports.co.uk/Our_Locations/Hull_Goole/

http://www.ports.org.uk/port.asp?id=5

http://sine.ncl.ac.uk/

http://peelports.co.uk/our-ports

http://www.southampton.ac.uk/~imw/West-Bay-Harbour-Beach.htm

http://en.wikipedia.org/wiki/Containerization

1.1.5 Broad Character: Coastal Infrastructure

1.1.5.1 Character Type: Flood and Erosion Defence

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Sea Defences includes the following Sub-types:

- Sea Defence
- Flood Defence

This Character Type relates to provision of structures designed to remove, reduce or mitigate the risk of coastal and estuarine flooding from the sea, rivers or un-channelled rainfall run-off, or to counter losses to coastal land from marine erosive forces. In practice, along the coast the concepts of both flood and erosion defence are commonly incorporated in one and the same structure, though their character in terms of siting, design and build may be more heavily influenced by the one or the other at different locations.

Sea defence relates to an artificial structure designed to counter losses to coastal land from the erosive forces of the sea. Such structures may work directly to withstand those forces along a defined line, as for example with sea walls, or they may seek to dissipate them in the intertidal zone, as with lines of spaced revetments. This Sub-character Type is here termed 'Sea defence' in preference to 'Coastal Defence' to avoid potential confusion with pre-1956 British military 'Coastal Defence' policy.

Flood defence relates to man-made constructions used to prevent water flooding the surrounding area. Often taking the form of a bank or wall but sometimes much more sophisticated e.g. the Thames Barrier, and may include run-off drains and reservoirs (http://thesaurus.english-heritage.org.uk). Areas of flood and erosion defence are often

slender and linear in form, and associated with other Character Types, for example 'Reclaimed Land' or 'Settlement'.

In England, this Character Type is administered under the Coast Protection Act 1949. The Department for the Environment, Food and Rural Affairs (DEFRA) generally gives maritime District Councils grant aid for undertaking works on the coastline provided it can be shown that the works are technically sound and are environmentally, socially and economically justified. The Environment Agency (EA) is an Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs and an Assembly Sponsored Public Body responsible to the National Assembly for Wales. The EA is the authority responsible for implementing and managing flood defence schemes in England and Wales. The EA also plays an important role in warning people about the risks of flooding, and establishing and maintaining flood-warning systems. Today, the Agency provides and maintains more than 34,000km of river and coastal defences in England and Wales (http://www.environment-agency.gov.uk/aboutus/default.aspx).

In England, Shoreline Management Plans (SMP) exist to promote the management of the coastline in a sustainable manner (see https://www.gov.uk/government/publications/shoreline-management-plans-guidance). An SMP is a large-scale assessment of the risks associated with coastal processes, projecting those risks' effects forward to periodic future scenarios, informing planning to reduce these risks to people and the environment, and providing context for future flood and erosion defence needs in a given area (http://www.environment-agency.gov.uk/research/planning/104939.aspx).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Type can include:

- breakwaters
- groynes
- sea walls
- dykes
- embankments

Coastal management is used throughout the world for many different purposes, but it is predominantly used to reduce coastal erosion and flooding. There are many techniques of coastal management including 'hard' and 'soft' construction and planning approaches. Hard construction is the more traditional response to erosion and involves the construction of structures which absorb and reflect or stop wave energy reaching the shore. These have often caused problems themselves, such as increasing erosion elsewhere. Soft construction techniques have become more popular because of this. Soft construction techniques involve promoting natural systems such as beaches and salt marshes which protect the coast, and are usually cheaper to construct and maintain than hard construction techniques.

Sea walls are one of the more traditional methods used in coastal management. Sea walls were constantly repaired and maintained throughout their active lifetimes, giving them historical depth. Often the position of sea defences has shifted due to coastal processes or changes in land management, including land reclamation, leaving them far inland. Programmes such as English Heritage's ongoing National Mapping Programme (NMP) are currently recording the position of some of these relict structures.

This Character Type has had an essential role in creating and maintaining vast areas of land reclamation around the English coasts from the Roman period onwards, especially, but not exclusively, in the Fens during the post medieval period. However in some cases, sea walls have been held responsible for losses of beach material *in situ,*

exposing and undermining the base of the wall, or enhancing erosion elsewhere along the coast.

England, like other countries, has a long history of defending coastal flood plains and extensive areas of reclaimed land with hard construction techniques like dykes and embankments. Since the 1990s this has been brought into question. 'Softer' approaches to coastal defence, which work with nature rather than against it, have been introduced. The EA and SMP initiatives are examples, with the EA working hard to ensure that current coastal management objectives are widely accepted and embedded in local planning policy.

The first generation of SMPs resulted in the production of individual strategic plans monitoring programs and studies only at a local or regional level (Murphy 2006) whilst the second generation provide a 'route map' for local authorities and other decision makers to move towards meeting our future needs (see Conditions and Forces for Change, below).

VALUES AND PERCEPTIONS

Sea and flood defences are generally perceived as essential for the preservation of many English coastal settlements as well as for the safety of the people who live in them. However, some people view the more visually intrusive recent sea defences as having a detrimental effect on the picturesque character of some of the smaller villages of England. There is also increasing recognition among local communities and heritage managers that patterns of historic sea defences and the areas of reclaimed land they maintained contribute strongly to local distinctiveness.

There are also conflicts between SMP coastal protection policy/resources and the perceived interests of some coastal communities: the high profile debates at Happisburgh (Norfolk) provide some examples. Elsewhere, the need for improved sea defences has been incorporated into regeneration schemes, such as the rebuilding of the Victorian promenade at Blackpool and the early twentieth century promenade at Cleveleys on the Fylde coast of North-West England.

Breakwaters are often highly visible features lending distinctiveness to coastal ports, large and small. They often feature in depictions of these places and become cultural reference points (e.g. 'The Cobb' at Lyme Regis, the breakwater at Bude).

RESEARCH, AMENITY AND EDUCATION

Sea and flood defences have been used in England for many centuries and as such some of the early coastal defence systems are now the focus of historical and archaeological interest in their own right (Fulford *et al* 1997, 190).

Sea and flood defences provide a stimulating and relevant focus for cross-curricular educational topics, including case studies looking at the environment, landscape, coastal change and sustainability. Case study resources related to flood defence schemes are freely available online, for example from Met Office Education and the Geographical Association.

CONDITION AND FORCES FOR CHANGE

Shorelines constantly change due to waves and tides. The extent of physical change depends on many factors, with changes over timescales ranging from seconds to centuries and millennia. Coastal processes have been hugely influenced by human activity over time, seeking to reduce erosion or flooding while maintaining and extending people's desired coastal management. In some cases this has taken place without a wider or coordinated appreciation of the effect these actions may have on other places along the coast (see http://www.environment-agency.gov.uk/research/planning/104939.aspx).

Coastal erosion has increasingly affected English coastal communities physically and perceptually and, more widely, aspects of both the natural and cultural dimensions of

our environment. This in turn has affected future commercial development opportunities along the coast. In response, DEFRA have made significant progress in understanding and mapping coastal processes to inform the development of SMPs. In the first generation of SMPs, many operating authorities adopted SMP recommendations as a basis for production of individual strategic plans, monitoring programs and studies for all or part of their coastline (Murphy 2006). The second generation of SMPs (SMP2s), in covering the entire coastline in England and Wales, provide a 'route map' for local authorities and other decision makers to move towards identifying the most sustainable approaches to managing the risks to the coast in the short term (0-20 years), medium term (20-50 years) and long term (50-100 years) (http://www.environment-agency.gov.uk/research/planning/104939.aspx).

In addition, the current Environment Agency (EA) policy on sea defences involves strategic planning to make decisions about maintaining and building new flood defences, as well as raising public awareness of people living in vulnerable areas. They also advise local, regional and central government on the building of sea defences and their environmental impacts (http://www.environment-agency.gov.uk/research/planning/104939.aspx).

The threat of flooding along the English coast and rivers is also an issue of rapidly increasing importance. The population at risk is likely to increase as residential, service and commercial development continues to take place on floodplains and low lying coastal regions while the effects associated with global warming, such as sea level rise and storm events, continue to intensify. Planning policies in place in England to manage flood risks are guided by PPS25, a key part of a holistic approach to managing risk as set out in the cross-Government programme developing strategy for flood and coastal erosion risk management in England, *Making Space for Water* (http://archive.defra.gov.uk/environment/flooding/documents/policy/strategy/strategy-response1.pdf) (Department for Communities and Local Government 2006, 2008). For specific lengths of the coastline, SMPs present a long term policy framework to reduce these risks in a sustainable manner. Their effectiveness requires adequate and properly interpreted information to be integrated into all stages of the SMP, ensuring proper consideration of the historic and cultural environment within the SMP process (see English Heritage 2003; Murphy 2006). HSC contributes to this, characterising the cultural context which has shaped the typical and commonplace of the present everywhere (see Dellino-Musgrave and Oxley 2007; Hooley 2004; 2011; Fairclough 2003, 2006).

RARITY AND VULNERABILITY

In general, coastal defences are fairly common and their associated structures are usually not designated. The vulnerability of this Character Type could be intensified if erosion rates increase. Their frequent occurrence along and, in historic terms, behind the coast, makes them a major feature in land- and sea-scape distinctiveness along some parts of England's coastline.

PUBLISHED SOURCES

Dellino-Musgrave, V, Oxley, I, 2007. England's Historic Seascapes: Characterising the Marine Historic Environment in V, Mastone, ed, *Advisory Council on Underwater Archaeology Proceedings, SHA-ACUA Conference 2007*, Williamsburg

Department for Communities and Local Government, 2006. *Planning Policy Statement 25: Development and Flood Risk*, London: Department for Communities and Local Government

Department for Communities and Local Government, 2008. *Planning Policy Statement 25: Development and Flood Risk Practice Guide*, London: Department for Communities and Local Government

English Heritage, 2003. *Coastal Defence and the Historic Environment, English Heritage Guidance*. London: English Heritage

Fairclough, G, 2003. The Long Chain: Archaeology, Historical Landscape Characterisation and Time Depth in the Landscape, in G Fry and H Palang, eds, *Landscape Interfaces: Cultural Heritage in Changing Landscapes*, Dordrecht: Kluwer Academic Publishers, 295-317

Fairclough, G, 2006. A New Landscape for Cultural Heritage Management: Characterisation as a Management Tool, in L Loznv, ed, *Landscapes Under Pressure: Theory and Practice of Cultural Heritage Research and Preservation*, New York: Springer Press, 55-74

Fulford, M, Champion, T, Long, A, eds. 1997. *England's Coastal Heritage: A Survey for English Heritage and the RCHME. RCHME/EH Archaeological Report* **1**, London: EH/RCHME

Hooley, D, 2004. England's Historic Seascapes. *Conservation Bulletin* **47**, 31-3

Hooley, D, 2011. What have we done? Mapping the historic cultural processes that shape our coastal and marine environment, *12th Wadden Sea Symposium Proceedings*

Murphy, P, 2006. *Shoreline Management Plan Review and the Historic Environment: English Heritage Guidance*. London: English Heritage

Rupp, S, Nicholls, R, 2002. Managed Realignment of Coastal Flood Defences: A Comparison between England and Germany in B, van Kappel, ed, *Proceedings of "Dealing with Flood Risk" An interdisciplinary seminar of the regional implications of modern flood management*

Websites

http://www.environment-agency.gov.uk/

1.1.6 Broad Character: Communications

1.1.6.1 Character Type: Transport

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Transport includes the main physical communication methods:

- Canal
- Railway
- Tramway
- Road
- Tunnel
- Bridge
- Civilian airfield

The Character Type Transport relates to areas of coastally-specific, maritime-related infrastructure related to the physical movement of people and/or goods.

Canals are artificial navigable waterways used for the transportation of goods. Nowadays they are also used for recreational purposes (http://thesaurus.english-heritage.org.uk).

Railways involve a line or track consisting of iron or steel rails, on which passenger carriages or goods wagons are moved, usually by a locomotive engine (http://thesaurus.english-heritage.org.uk).

Tramways refer to a light railway on which raw materials, goods and/or passengers are conveyed. Early usage was predominantly industrial with carriages hauled by animal power or by a centralised power source. In later usage tracks were inlaid into a road

surface, on which tram cars run, powered by a centralised source, usually for the conveyance of passengers.

Roads are 'a way between different places, used by horses, travellers on foot and vehicles' (http://thesaurus.english-heritage.org.uk). Within a HSC context roads will be those related to coastal areas, coverage of ports, shipping routes, ferry crossings and ferry routes, for example.

Tunnel refers to an elongated, enclosed routeway for the transportation of goods and people under roads, railways, rivers, or through topographic features such as hills (http://thesaurus.english-heritage.org.uk).

Bridge is a structure with one or more openings beneath it to span a river or other physical obstacle, for the purpose of providing passage over that obstacle. Bridges commonly have substantial dedicated approach areas and their abutments and support pier/pillar footings may go deep into the beds of rivers and estuaries.

Civilian airfield refers to areas used for the landing and take-off of primarily civilian aircraft, often including associated buildings, equipment and other installations (http://thesaurus.english-heritage.org.uk).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Canals were important elements in early industrial development since they met the need for cheap transport of raw materials and manufactured items. In Europe, particularly England, inland canals preceded the development of railroads during the earliest phase of the Industrial Revolution. In the 1760s, the opening of the Bridgewater Canal (North West England) halved the price of coal in Manchester. This triggered a period of "canal mania" in England and between 1760 and 1820 over one hundred canals were built. The culmination of canal building came at the end of the nineteenth century, with the opening of the Manchester Ship Canal from Eastham on the Wirral to new, purpose-built dock facilities in Salford and Manchester. It allowed deep draft ships to access Manchester directly, avoiding port charges at Liverpool, and led to the development of Manchester as the country's largest inland port (Wood 2005).

In the 19th century, England was the leading country in the development of the railways which transformed lifestyles not only at a national but also an international level. In the early 19th century, various fundamental technical advances were made by engineers such as Richard Trevithick, George Stephenson and his son Robert Stephenson, leading to the development of the steam locomotive. During this time, the first passenger horse-drawn railway was opened between Swansea and Mumbles in Wales. In 1811, John Blenkinsop designed the first successful and practical railway locomotive - a rack railway worked by a steam locomotive between Middleton Colliery and Leeds on the Middleton Railway. The locomotive, *The Salamanca*, was built a year later. In 1830, the first commercial passenger steam railway, the Liverpool and Manchester Railway, opened.

Many coastal settlements were established or developed as a result of the advent of the railway network. This is particularly true in East Anglia where coastal resorts were often farmland and small hamlets prior to the construction of the railways. In many cases wealthy individuals bought land specifically to create resorts as a result of this development. It has been argued that some resorts such as Clacton owe their existence entirely to the railways (Williamson 2006, 125) which also brought tourism to the Broads. Similarly, ports were able to expand as new industry, parcels and passengers were brought to the docks.

Steam locomotives required large investments in labour to clean, load, maintain and run. After World War Two (WW2), labour costs increased dramatically in developed countries, making steam an increasingly costly form of transport. At the same time, the war had forced improvements in internal combustion engine technology that made diesel locomotives cheaper and more powerful. This caused many railway companies to initiate programs to convert from steam to diesel locomotion.

From the 1950s, the period of large-scale motorway construction began. This marked a deliberate policy shift from railways to roads, as England's primary means of transporting goods and people. Rail transport also faced competition from roads for commuting, and air transport took passengers from long-haul trains. Where roads in towns had contained trams, most were replaced by buses, while high trans-shipment costs caused short-haul freight trains to become uncompetitive. The 1990s saw an increased focus on accessibility and low-floor trains. Many cities that closed their old tramways have reopened them as new light railway systems, as for example in Manchester.

The Channel Tunnel is the longest undersea tunnel in the world, linking Folkestone in Kent (England) to Coquelles in Pas-de-Calais (France). Eurotunnel shuttles, Eurostar and national freight trains run in the two single track and single direction tunnels at a maximum speed of 160km/h.

Road transport has developed over the centuries from foot transport to motorways and their related service points. The earliest routeways are often still in use and have been developed over the centuries, others have become disused and superseded by later constructions. Several early trackways have been found in England in intertidal contexts. For example, the Neolithic trackways on the Isle of Wight at Wootton Quarr (Waller 2006) and the Formby prehistoric footprints (Merseyside) (Huddart *et al* 1999). Some of these included built wooden tracks used to traverse wetlands and boggy areas around the coast and estuaries. Examples are found dating as far back as the Mesolithic in Ireland and the Neolithic in England. These include the Hightown Neolithic trackway near the mouth of the Mersey River with radiocarbon dating of 3960-3690BC (Gonzalez and Cowell 2007), and the Post Track and Sweet Track in Somerset, dated, dendrochronologically, to 3838 BC and 3807/3806 BC respectively (Pollard and Healy (eds) 2008, 75). Additional work, such as the Rapid Coastal Zone Assessment Surveys (RCZAS), have also found previously unrecorded trackways including one on the Deben foreshore just below Sutton Hoo in Suffolk.

Packhorses were the chief form of transport for goods in England until the late 18th century. Away from main routes, their use continued into the 19th century. In remoter areas, this usage has left a legacy of old paths still called *packhorse roads*, along with narrow and low stone arched packhorse bridges in various areas (e.g. Hacketty Way Bridge, Somerset). Many such former packhorse routes are now popular walking trails: walking remains a dominant means of commuting and recreation, valued for helping to maintain a healthy lifestyle.

England contains the vast majority of the UK's motorways, dating from 1958 (part of the M6) to the most recent (M6 Toll). Today, the Department for Transport is the government department responsible for the English transport network.

VALUES AND PERCEPTIONS

Some of the prehistoric trackways discovered in coastal and wetland areas have associated features showing they were endowed with religious values relating to the remote and liminal areas they accessed. This is particularly striking in the Bronze Age when water appears to have been afforded a particular spiritual value as demonstrated at the complex at Flag Fen, Cambridgeshire, and by the many artefact hoards deposited in watery contexts.

Canals have a lasting imprint on the present-day landscape from the 18th-19th century period of prosperity and success, affecting not only their own route but a wider swathe of associated settlement and land use. At the same time, they remain an integral part of the present social and cultural landscape, with a range of current uses, including leisure. In general, the early narrow industrial canals have ceased to carry significant amounts of trade. Many have been abandoned to navigation. In other cases, railways have been built along the canal route (e.g. Croydon Canal). In some cases, the Kennet and Avon Canal being an example, abandoned canals have been restored and are currently used for pleasure boaters. The towpaths may be used as footpaths, alongside

which have sprung up leisure facilities such as cafes. Recently, in England, canal-side housing has become relatively popular. Another use of canals in the 21st century is as wayleaves (right of way in return for payment) along the towing paths for fibre optic telecommunications networks.

The imprint of rail and roads on the present landscape and seascape is vast, providing the major part of the landward transport infrastructure by which our ports function as hubs connecting the land and sea transport systems serving our society's needs. Coastal road and rail networks are also expressed in the ribbon development spreading residential, commercial and recreational areas along many of our coastlines. Conversely, in remote areas such as the Suffolk Coast and Heaths AONB transport is limited both in terms of rail and road. Whilst this can deter visitors it is also one of the main attractions of the area which retains its air of 'tranquillity'.

RESEARCH, AMENITY AND EDUCATION

Generally, in England, research has focused on canals from an 'industrial' and 'historical' point of view. Further research integrating maritime perspectives will contribute to a greater understanding of canals regionally, nationally and internationally. Today, canals are largely used for leisure purposes. As such, education and outreach initiatives which bring together leisure activities whilst also exploring the 'industrial heritage' of canals would be highly beneficial in terms of educating and raising public awareness. This could also be the starting point of promoting and seeking further economic benefits.

Further research on early long distance routeways would be highly beneficial at national, regional and local levels, by looking at the developing relationships through time between coastal populations, trade, transport and topography.

Communication routes are the means by which many perceive and appreciate other the historic cultural landscape and seascape, while also themselves possessing a range of features which are express people's past activity. Bridges, viaducts, stations, roadside services and other infrastructure are also interesting elements contributing to their landscape/seascape.

CONDITION AND FORCES FOR CHANGE

In contrast with the large-scale European barge canals which continue to operate for freight transport, the narrow English early industrial canals have ceased to carry significant amounts of goods. Several have been abandoned to navigation, becoming derelict and overgrown, whilst in some cases railways have been built along the canal route (e.g. Croydon Canal). Elsewhere, abandoned canals have been restored and are currently used for pleasure boating.

Railways are still a major functional aspect of the nation's heritage, building on England's leading role in introducing the commercial railway. Many railway routes were later abandoned for road transport and several are now used as footpaths or cycle-ways; many others are derelict. Today, rail transport is an energy-efficient and capital-intensive means of mechanised transport which has emerged from post-war under-investment in favour of promotion of road for transport of goods and people (e.g. Eurotunnel).

Construction of communication routes at or near the coast frequently involves major engineering projects as coastal areas frequently present unstable environments (e.g. the main rail line from London to Cornwall between Dawlish and Teignmouth in Devon). Demands for new communication routes arise from a variety of factors including increased traffic to the coast, changing configuration of the coastline, rising sea-levels, and coastal defence initiatives, amongst many others. The environmental, including landscape, effects of such projects are assessed through the EC requirement that their proposals are subject to Environmental Impact Assessment (EIA).

RARITY AND VULNERABILITY

Today, the scale of change has affected the size and frequency of key nodal transport points. It has also affected the expression of past and present transport infrastructure along the coast as well as the low, easily overlooked (and therefore vulnerable) character of many early transport-related features.

PUBLISHED SOURCES

Fulford, M, Champion, T, Long, A, eds, 1997. England's Coastal Heritage: A Survey for English Heritage and the RCHME. *RCHME/EH Archaeological Report* **15**, London: EH/RCHME

Gonzalez, S, Cowell, R, 2007. Neolithic Coastal Archaeology and Environment around Liverpool Bay, in J, Sidell, and F, Haughley, eds, *Neolithic Archaeology in the Intertidal Zone*, Oxford:Oxbow Books

Huddart, D, Roberts, G, Gonzalez, S, 1999. Holocene Human and Animal Footprints and Their Relationship with Coastal Environmental Change, Formby Point, NW England, *Quaternary International* **55**, 29-41

Pollard, J, and Healy, F, (eds) 2008. '*Neolithic and Early Bronze Age'* in C J Webster, ed, 2008, *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council, 75-102

Waller, R, 2006. *Neolithic to Early Bronze Age Resource Assessment: Isle of Wight*

Williamson, T, 2006, *England's Landscape: East Anglia*,London:English Heritage

Wood, C, 2005, *Manchester's Ship Canal. The Big ditch,* Stroud: Tempus

WEBSITES

http://canalrivertrust.org.uk/

http://www.waterwaysireland.org/

http://www.eu-esis.org/Alternative/UKaltQ8.htm

1.1.6.2 Character Type: Telecommunications

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Telecommunications includes the following Sub-type:

- Submarine telecommunications cable

This Character Type covers telecommunications infrastructure across coastal land, inter-tidal and marine zones. This includes historic telegraph stations and their associated cabling, and civic listening devices. Modern cables also transfer mass media such as the Internet and telephone systems.

'Submarine telecommunications cable' refers to cables or pipes laid beneath the sea to carry telecommunications. This is the most frequent function of submarine cabling, especially those covering long distances.

In general, modern telecommunications systems still require the use of submarine cables in addition to satellites. British Telecommunications plc is the principal body laying and operating submarine communications cables around England.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

In 1850, John Watkins Brett's Anglo-French Telegraph Company laid the first telecommunications line across the English Channel. It was a copper wire coated with gutta-percha, without any other protection. In 1851, a protected core, or true cable, was laid from a government hulk, the *Blazer*, which was towed across the Channel. In 1852, a cable laid by the Submarine Telegraph Company linked London to Paris for the first time. In 1853, England was linked to the Netherlands by a cable across the North

Sea, from Orford Ness to The Hague (http://en.wikipedia.org/wiki/Submarine_communication_cable). The first transatlantic cable was laid in 1865-6 by the *SS Great Eastern*. The remote beach at Porthcurno in Cornwall became a major international submarine telegraph cable station in the late 19th century: the first cable was landed there in 1870, part of an early international link stretching from the UK to India.

The first submarine communications cables carried telegraphy (written communication) traffic. Later generations of cables carried first telephony (voice communication) traffic, and then data communications traffic. All modern cables use optical fibre technology to carry telephone traffic as well as Internet and private data traffic (http://en.wikipedia.org/wiki/Submarine_communication_cable).

The unprecedented popularity of the Internet and the development of e-commerce have brought about a considerable increase in global electronic data transmission over the last few years. As a consequence, the number of cables linking England with mainland Europe has grown considerably.

Generally speaking, cables are trenched to a depth of 40-90cm with rock-dumping used as a last resort to anchor cables. However, older redundant cables are more likely not to have been trenched (Department of Trade and Industry 2002a, b).

VALUES AND PERCEPTIONS

The presence of submarine telecommunications cables across the coastal and marine environment is very unlikely to be perceived by most people who use them. Despite that, they play a vital role in enabling the volumes of rapid communication that transformed the world's social, economic and political lives initially during the latter half of the 19th century and again, at a revolutionary scale, at the end of the second millennium.

RESEARCH, AMENITY AND EDUCATION

The early telegraph station at Porthcurno, including the hut above the beach that received many of the cables, is now presented as a well-visited museum and visitor attraction. It is also widely perceived as a major part of Cornwall's current character: its contributions to global communications technology, in conjunction with the nearby satellite telecommunications station at Goonhilly Downs on the Lizard.

The need for submarine telecommunication cables and the logistics, practicalities and issues associated with their installation and maintenance would provide an interesting cross-curricular educational case-study, balancing those technical issues with their application in enabling Internet, telephone and other media access, opening up a varied range of educational and amenity tools accessible to the public.

Some surviving early cables in English waters offer insights into the early development of telecommunications in the 19th-20th centuries, an aspect that has received scant attention from maritime archaeologists.

Coastal and sea-floor works undertaken during cable-laying and or maintenance also offer opportunities to investigate material remains of the historic environment in those areas, adding to our knowledge and further refining future landscape/seascape characterisation. Palaeoenvironmental evidence has been unearthed during such works; uncovering deposits rich in pollen taxa and macrofossils that can further inform our knowledge of the evolution of marine transgressions and the previous character of the present sea-floor.

CONDITION AND FORCES FOR CHANGE

Cables are replaced fairly regularly as they reach the end of their functional lifespan or sometimes are damaged in their vulnerable sea-floor positions: although relatively uncommon, trawling and anchoring can cause breaks in cables (Fulford *et al* 1997). They also become obsolete as technology develops rapidly.

As with all offshore development, preliminary survey work, laying and maintenance of cables and the removal of disused cables will affect the character of the landscape/seascape. Preparatory investigation may involve intrusive survey of the sea-floor, exposing archaeological deposits, but also providing detailed knowledge of seabed conditions. Laying the cables involves burying them where they cross the foreshore and in shallow waters, intruding into earlier aspects of the historic environment there. In deeper waters, submersible ploughs running on tracks or skis and towed by surface vessels are used for trenching, laying cable, and subsequent inspections (see Fulford e*t al* 1997).

RARITY AND VULNERABILITY

The laying of telecommunications cables is likely to increase as a result of the rapid growth in the global use of the Internet and the development of higher capacity fibre optic cables. However, the development of wireless technology may eventually lead to the redundancy of many of these cable routes.

PUBLISHED SOURCES

Department of Trade and Industry. 2002a. *Strategic Environmental Assessment of Mature Areas of the Offshore North Sea SEA2*, London: DTI

Department of Trade and Industry. 2002b. *Strategic Environmental Assessment of Parts of the Central & Southern North Sea SEA 3*, London: DTI

Fulford M, Champion T, and Long, A, eds. 1997. England's Coastal Heritage: A Survey for English Heritage and the RCHME, *RCHME/EH Archaeological Report* **15**, London: EH/RCHME

Websites

http://en.wikipedia.org/wiki/Submarine_communication_cable

1.1.7 Broad Character: Military

1.1.7.1 Character Type: Military Defence and Fortification

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The 'Military defence and fortification' Character Type includes the following Sub-types:

- Coastal fortification (unspecified)
- Roman fortification
- Medieval fortification
- Post-medieval fortification
- Early modern fortification
- Modern fortification
- WW1 fortification
- WW2 fortification
- WW2 defence area
- Naval battlefield

This Character Type relates to defensive areas in coastal locations are designed to deter or prevent attack from seaward (i.e. by sea or air) although they may be locally oriented to defend against enemy troops attacking our coastal defences from landward too. Individual defensive sites, such as anti-landing defences, concrete pillboxes and decoy sites are often components within more complex arrangements of built and fieldwork fortifications tailored to the landscape form and designed to protect strategic areas. During WW1 the Defence of the Realm Act 1914 enabled vast tracts of land to

be requisitioned for camps, airfields, munitions production, and storage. At the outbreak of WW2 in 1939 a similar Act was passed, the Emergency Powers (Defence) Act 1939, and coastal defences were greatly extended.

Coastal fortification (unspecified) refers to military fortified areas and sites of unspecified or uncertain date in coastal locations.

The specified broad period subdivisions of this Character Type relate to the following date brackets:

- Roman fortification: AD 43-410
- Medieval fortification: AD 410-1540
- Post-medieval fortification: AD 1540-1750
- Early Modern fortification: AD 1750-1900
- Modern fortification: AD 1900 – present day

World War One fortification refers to coastal military fortified areas and sites whose present character is dominated by construction and use during the First World War (1914-1918).

World War Two fortification refers to coastal military fortified areas and sites whose present character is dominated by construction and use during the Second World War (AD 1939-1945).

World War Two defence area refers to coastal parts of the planned, strategically inter-related and largely static anti-invasion defences established in 1940-1941 during the Second World War.

Naval battlefield refers to areas of former naval battlefields, where they form the dominant character of those areas. Although usually fought on or above the sea surface, they may be associated with enhanced material imprints still extant in the form of wrecks and other debris.

Military fortifications are found along most of the English coast. The word 'fortification' can refer to the defences around a specific defensive 'site' or to the practice of improving a large area's defence with defensive works, as for example by town or city walls.

This Character Type is commonly located in strategically-positioned areas providing good sea views both to see and focus attack upon an approaching enemy. Mid 16th-18th century defences were usually guided by national defensive considerations but as with earlier defences they were frequently concentrated near ports since these were generally the areas where foreign attack could give an enemy the most effective foothold. Greater military mobility from the 19th century required a broader territorial approach to the nation's defence, with seriously threatening attacks possible anywhere along the nation's coastline.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type can include:

- Anti-tank defences
- Artillery
- Fortifications
- Anti-landing features
- Batteries and gun emplacements
- Castles and forts
- Moats and dykes

- Town walls and gates
- Minefields
- Pillboxes
- Battlefields and sites of battles
- Naval warships, submarines (including wrecks) and military aircraft crash sites

Since at least the stages at which human populations became more sedentary, there has been need to protect one's resources from others. It is in the Neolithic in Britain that fortified settlements appear, surrounded by substantial ditches and banks or rubble walling, suggesting that there was some kind of 'planning' in their construction. An increase in population, pressure on resources and changes in society may have created the need to demarcate and defend property. Defended settlements become much more widespread during the later Bronze Age and Iron Age, from around 1000BC, and there are many impressively sited defended prehistoric sites on coastal hills and cliffs, especially of southern England, built over 2,500 years ago. These forts, with their large enclosing banks and ditches, are thought to have been constructed to emphasise wealth and status as well as being used for defence. Although the British population at this time had extensive social and trading contacts with people from Europe, it is unlikely that continental coastal attacks were of any significance. It is more likely that the defences, if that was their intended function, were constructed as protection from neighbouring groups (see Hegarty and Newsome 2007). In south west England, many headlands were cut off by banks and ditches forming 'promontory forts' or 'cliff castles', although their exact function has been much debated (Sharpe 1992; Herring 1994).

In the early years of Roman influence in England, the construction and location of coastal installations was not related to territorial defence alone, rather they were related to securing supply routes, the transportation of goods and the harbouring and maintenance of the Roman naval fleet (see de la Bedoyere 2006; Laycock 2008). A series of 'Saxon Shore' forts were built in the 3rd century AD to defend against the increasing threat of Germanic invasion and piracy. These stretched from Brancaster in Norfolk to Porchester in Hampshire; a number still survive, several modified by later fortification, although others were lost to the sea, plundered for stone or allowed to erode away.

The Norman Conquest in 1066 saw the beginning of a new phase of war and conquest in England (Friel 2003, 49). The Norman Conquest was a pivotal event in English history, largely removing the native ruling class and replacing it with a foreign, Norman-French-speaking monarchy, aristocracy, and clerical hierarchy. This in turn brought about a transformation of the English language and the culture of England. By subjecting the country to a ruling class with substantial interests and landholdings also in France, it re-orientated England toward continental Europe and away from the Scandinavian world. It also had a significant impact on the landscape with the erection of impressive castles not only for defence but also as a symbol of their power and overlordship: those which survive still have the power to impress today. Most of these messages were at first directed internally to the conquered English population but some, as at the Tower of London and the twin mottes of Baile Hill and Clifford's Tower, York, were also sited to impress those using our estuaries to reach England's major trading centres. From the 12th century their rebuilding in stone by the Norman aristocracy was supplemented by a series of new coastally-sited fortifications, good examples being those designed to defend against Scottish attacks at Scarborough Castle, North Yorkshire, and Warkworth and Bambrugh Castles, Northumberland.

In the late 13th century the naval defence of England was divided between the Northern and Western Fleets. The Northern fleet generally covered the coast from Thames to Scotland and the Western fleet covered the seaboard from the Thames to Bristol. The

naval expedition, the sea patrol and the coastal raid were the commonest types of naval operations that English ships undertook in the medieval period (Friel 2003, 57).

Large-scale naval battles were very rare during the medieval period. However, much activity during the Hundred Years War took place near the coast (http://en.wikipedia.org/wiki/Hundred_Years_war). Attacking a fleet in an anchorage or a restricted waterway, or intercepting a fleet passing close to the coast were favoured tactics. It was not until the addition of shipboard guns that sea battles became more common as a form of naval warfare. Shipboard guns were used in small numbers by the English and others from the 1330s, but they were essentially small anti-personnel weapons (Friel 2003, 58).

Defensive castles appeared on ships by the late 12th century, at first as rather makeshift-looking structures. Medieval sea battles were normally resolved by boarding actions. Through time, defensive 'castles' became a normal part of the structure of some vessels, particularly warships (Friel 2003, 80). The number of guns on ships significantly increased in the second half of the 15th century. By the end of the 15th century, large warships had multi-stage castles, a change possibly dictated by the massive increase in the number of guns carried by large combatants. However most warships did not carry large guns until the 16th century (Friel 2003), the *Mary Rose* being an example. During the 16th century, the Reformation and England's growing economic power left the country more vulnerable to invasion. That and the creation of an efficient, highly centralised administration under the Tudors led to the development of a nationally-focussed strategy for England's coastal defences. Specific programmes of coastal defence were seen under Henry VIII and in the 1580s due to the threat of the Spanish Armada. These involved the protection of key anchorages such as the Humber and the Thames, which if captured could be used as footholds from which to launch a full scale invasion. Fortifications originating in this phase include Landguard Fort at Felixstowe, Suffolk; Tilbury beside the Thames in Essex, and Pendennis and St Mawes Castles flanking the entrance to the Carrick Roads, Cornwall.

In the 17th century, the commercial success of the Dutch fuelled English rivalry and led to the Anglo-Dutch wars for control over the seas and trade routes. The first Anglo-Dutch War (1652-54) took place in the English Channel and North Sea and included the Battles of Kentish Knock (1652) and the Gabbard (1653), both taking place off the East Anglian coast. During the second Anglo-Dutch War (1665-67) most of the fighting took place in the southern North Sea, including the Battle of Lowestoft (1665). A flotilla of Dutch ships broke through the defensive chains guarding the Medway and burned part of the English fleet docked at Chatham. An invasion force of 1500 Dutchmen was repelled at Landguard fort in 1667, having landed on the beach at Felixstowe. The third Anglo-Dutch War (1672-74) took place along the coast of East Anglia and included the Battle of Sole Bay (1672) off Southwold, Suffolk. The 'Glorious Revolution' of 1688 ended the 17th century conflict by placing William III of Orange on the English throne as co-ruler with his wife Mary. The Dutch merchant elite began to use London as a new operational base but the Dutch economic growth slowed. The later 18th century saw the growth and establishment of the English maritime power. Some of the Dutch impact still survives in today's coastal landscape on the 'Dutch-style' buildings found in some areas of London and East Anglia.

England remained at war throughout the period of the Napoleonic Wars (1803-1814). Having built and lost most of its colonial empire in the preceding decade of the Revolutionary Wars, French efforts were focused mainly in Europe. Consequently, Napoleon Bonaparte saw an invasion of England as the key to supreme control over Europe. England responded with a new coastal defence strategy which included a chain of forts to be built along the coast, which in turn prompted a survey to assess potential locations and vulnerable points. The resulting forts were squat, circular towers, known as Martello Towers after a similar structure at Mortella, Sicily. In England, 105 were built along the south and east coasts between Aldeburgh in Suffolk and Seaford in

Sussex and there are still many surviving in today's landscape, some re-used for a variety of purposes.

By the 20th century, the imprints from responses to the threat of war in England were considerable. For fifty years prior to WW1, England's defences concentrated on the protection of naval bases, since the main defence of the country was considered to rest with the Royal Navy. Military structures were confined largely within the ports and the garrison towns, although some fortification of vulnerable expanses of coastline was performed (English Heritage 2003).

At the beginning of WW2, England was ill-prepared to defend against an expected invasion by Germany and fortification only began in earnest after the German invasion of France in 1940. England's defence policy was based on maintaining a 'coastal crust' of beach defences and the deployment of the few available mobile columns, combined with static defended lines, 'stop-lines', extending inland across over a wide areas of the country. Their purpose was to obstruct and contain the advance of an enemy from the coast or an inland airborne landing, both by the use of obstacles and by fire from troops on the ground, thus allowing time for relief by a mobile reserve (e.g. fortification of the east coast) (English Heritage 2003). Beaches were to be made impenetrable by erecting scaffolding. Thousands of mines were placed behind the scaffolding. Behind the mines was barbed wire and behind the wire were more land mines. Finally, across the top of the beach, anti-tank blocks were sited. Behind the beach area, pillboxes were built to house machine guns (Green 2006; Whaley *et al* 2008). Special attention was given to areas of strategic importance such as Harwich Haven. A series of structures were also erected in the marine zone around the Thames and Mersey estuaries, known as Maunsell forts after the designer. These were intended to act as an early warning system, break up aircraft formations and prevent minelaying.

World War Two defences were later extensively dismantled and cleared. In 1956, the formal end of the military coastal defence policy in England was announced. Upon abandonment a number of the Maunsell forts were utilised by pirate radio stations and the Rough Sands fort in the Thames Estuary is still so occupied as the 'Principality of Sealand'.

VALUES AND PERCEPTIONS

Fortifications of different periods tend to generate differing perceptions. The 'heritage' of older structures such as late Roman Saxon Shore forts and medieval castles are often valued, protected and visited recreationally. The 19th century and later defences have been often viewed with less sympathy for their role in the nation's ongoing defence, possibly due to the temporal closeness of the threat they represented and a wider dislike of concrete structures among the general public, especially where those structures are located in rural coastal areas.

But there are clear signs that attitudes are changing as the World Wars gradually pass from living memory. Programmes of clearance of 'unsightly concrete structures' are being replaced by research programmes turning their attentions to recording and understanding the surviving traces from these later periods. There is increasing recognition too that as for most periods, the more visible built structures from these late periods are closely related to the lie of the land and coast, and are usually complemented by a much wider complex of less visible earthwork defensive features including systems of connecting trenches. They are becoming perceived as part of the overall historic legacy of the coastal landscape.

RESEARCH, AMENITY AND EDUCATION

Castles and other historic fortifications along the English coast act as clear foci for tourism and educational initiatives and many have had specific educational resources developed, for example for Tintagel Castle (Cornwall) (see http://www.english-heritage.org.uk/server/show/nav.15393).

There is now widespread and ongoing research interest in 20th century military defences, with WW1 and WW2 military remains forming one of the most active areas of research for special interest groups in recent years. The larger coastal defence batteries from WW1 are relatively well known, but not so the contemporary practice trenches and smaller fortifications. In general, the material remains of WW2 have attracted the greatest interest, reflecting the greater number of surviving features and illustrating the active living memory of this event in some members of the population (Petts and Gerrard 2006, 190).

A result of an increased public interest in surviving military remains was the Defence of Britain Project (DoB) (1995-2002), which ran under the auspices of the Council for British Archaeology. The purpose of the project was to record the 20th century militarised landscape of the UK, and to inform the responsible heritage agencies at both local and national level with a view to the future preservation of surviving structures (http://www.britarch.ac.uk/cba/projects/dob). Nearly 20,000 20th century military sites were recorded in the UK as a whole.

World War One and World War Two remains are also found underwater but are generally understudied, a contributing factor being that some of them could be considered as dangerous due to the potential presence of munitions. These submerged remains often have amenity value due to their popularity with sports divers. Educational value could be further explored through interactive web-interfaces.

In England, there are a number of military vessels (and all military aircraft crash sites) which are protected as war graves under the Protection of Military Remains Act 1986. The primary reason for designation as a 'war grave' is for it to be conserved the last resting place of UK servicemen (or other nationals). The Act does not require the loss of the vessel to have occurred during war.

A number of Martello towers in particular have been re-used as public amenities including museums and galleries. The tower at Jaywick in Essex is a good example, displaying exhibitions relating to Community, Heritage and Environment.

CONDITION AND FORCES FOR CHANGE

The physical evidence of this Character Type in the landscape/seascape, especially for WW1 and WW2, is a diminishing resource due to the effects of time, erosion and vandalism. Saltmarsh reclamation in later periods may also have affected the survival of pre-existing historical features of large defended coastal areas.

Many of the Early Modern and older coastal fortifications are recognised as ‘heritage assets’ and designated as such, with statutory protection in place and often conservation management plans of various forms too. Loss from coastal erosion inevitably remains an issue though, sometimes on a larger scale: the ‘Sole Bay’ of the 1672 Battle of Sole Bay no longer exists: that topographic feature on the Suffolk coast has long been lost to erosion.

Coastal erosion is a particularly serious issue for fortifications along most of the rapidly eroding lengths of England’s east coast, especially those more recent ones, with the result that many WW2 pillboxes (and the less recognised WW1 examples) toppled from the low cliffs onto the beaches below.

Formally sanctioned programmes aimed at clearing ‘unsightly concrete structures’ from the two World Wars have largely ceased but occasional acts of clearance, sometimes under the guise of health and safety measures, do still occur as with the deliberate destruction of two pillboxes at Talland Bay, Cornwall, in the early 2000s.

Projects such as the ‘DoB’ Project and Rapid Coastal Zone Assessment Surveys (RCZAS) have begun to record and encourage interest in some of the more forgotten structures. Increasingly World War defences are becoming tourist attractions in their own right.

RARITY AND VULNERABILITY

This Character Type is quite widely represented along most of England's coastline, its many and varied expressions and dates reflecting those areas considered strategically defensible under various regimes and technologies, but they also reflect the ingresses of coastal erosion, again with date implications for the range of surviving coastal features in any given area.

In terms of vulnerability, raising understanding and awareness of the significance and unique values of coastal military remains in England will make them more sustainable as a resource and accessible to present and future generations. The vulnerability of this Character Type in the landscape is mainly due to erosion processes and neglect but it is also to some extent at risk of change from onshore and offshore commercial and industrial developments. Such risks should, however, be identified through the necessary Environmental Impact Assessments (EIA), enabling an assessment of the potential impacts (positive or negative) that a proposed project may have on the environment, specifically including landscape factors (of which 'seascape' is a subset).

PUBLISHED SOURCES

De la Bedoyere, G, 2006. *Roman Britain: A New History*, London: Thames & Hudson

English Heritage. 2003. *Twentieth-Century Military Sites: Current Approaches to their Recording and Conservation,* English Heritage.

Friel, I, 2003. *Maritime History of Britain and Ireland,* London: The British Museum Press

Green, G, 2006. *The Home Front: Teesside Defences During World War II*: Hartlepool: Tees Archaeology

Hegarty, C, Newsome, S, 2007. *Suffolk's Defended Shore. Coastal Fortifications from the Air*, Swindon: English Heritage

Herring, P, 1994. The cliff castles and hillforts of West Penwith in the light of recent work at Maen Castle and Treryn Dinas, *Cornish Archaeology* **33**, 40-56

Johnson, M, ed, 2002. *Behind the Castle Gate. From Medieval to Renaissance*. London: Routledge

Laycock, S, 2008. *Britannia - The Failed State: Tribal Conflict and the End of Roman Britain,* Abingdon The History Press

Petts, D, Gerrard, C, 2006. *Shared Vision. The North East Regional Research Framework for the Historic Environment,* Durham: Durham County Council

Sharpe, A, 1991. Treryn Dinas: cliff castles reconsidered, *Cornish Archaeology* **31**, 65-8

Whaley, R, Morrison, J, and Heslop, D, 2008. *Archaeology of the Twentieth Century Defence Sites of the Tyne and Wear. An Illustrated Guide,* Newcastle: Newcastle City Council (http://www.newcastle-city-council.gov.uk/wwwfileroot/regen/locallist/tyne_and_wear_defence_sites.pdf)

Websites

http://www.britarch.ac.uk/projects/dob/review/index.html

http://en.wikipedia.org/wiki/Dogger_Bank

http://www.ukho.gov.uk/

1.1.7.2 Character Type: Military Facility

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Military Facilities includes the following Sub-types:

- Barracks
- Firing range (land)
- Military airfield
- Military base
- Ordnance dumping
- Military practice area
- Naval dockyard
- Naval firing range

This Character Type covers a broad range of areas and sites intimately connected with military activity but ancillary to the locations of defensive or offensive activity themselves. So for example it includes training areas and establishments, barracks, and repair and maintenance areas.

Barracks are areas of buildings designed to house members of the armed forces (http://thesaurus.english-heritage.org.uk). Such areas may also include closely related buildings such as refectories, mess rooms, hospitals, schools and gymnasia.

A 'Firing range (land)' involves a piece of ground on which small arms or large artillery may be fired at targets (http://thesaurus.english-heritage.org.uk) as part of military training.

Military airfields are landing or taking-off areas for military aircraft. They often include ancillary structures and buildings for the maintenance and storage of aircraft, etc. (http://thesaurus.english-heritage.org.uk).

A 'Military base' is a building or groups of buildings, often surrounded by a system of fortifications, used as residential and training sites by members of an armed force (http://thesaurus.english-heritage.org.uk).

Ordnance dumping is an area regularly used for disposal of spent or redundant military weaponry. Material known to have been dumped at sea includes both conventional and chemical weapons, and the mode of disposal may include carriage on ships scuttled over the disposal site.

A 'Military practice area' is an area used by armed forces on land or at sea for training and military exercises.

A 'Naval dockyard' is a naval base that builds, repairs, docks or converts warships, and is manned by civilian engineers and workers and administered by engineer duty officers (http://thesaurus.english-heritage.org.uk).

A 'Naval firing range' refers to an area of sea across which naval ships fire artillery at target sites or areas. In some cases accompanied by land-based observation facilities housing equipment to record accuracy and damage (http://thesaurus.english-heritage.org.uk).

Most military bases have restricted access to the general public and usually only authorised personnel may enter them (be it military personnel or their relatives and authorized civilian personnel). Military bases usually provide housing for military personnel, a post office and refectory facilities. They may also provide support facilities such as snack bars, a petrol station, chapels, schools, a hospital or clinic (dental and/or health clinics), shopping and convenience retail stores. Sometimes facilities such as fitness centres, libraries, athletic fields, and nurseries, amongst others can be found. Military bases provide accommodation for one or more units, but they may also be used as a command centre, training ground or providing ground.

Naval dockyards are often characterised by dry docks, basins, and tidal berths. Other facilities may include naval training establishments and bases for the Royal Marines

(e.g. Plymouth). Often, some dockyards open to the public on certain days to enable visits by local residents and tourists (as for example on the Plymouth 'Navy Days'). Those that have museums are generally open most of the year (e.g. Portsmouth and Chatham).

Around English Territorial Waters there are several designated military practice areas, formally entitled 'Practice and Exercise Areas' (PEXAs), which are in use or available for use by the Ministry of Defence (MoD) for practice and exercises. These include Royal Air Force (RAF) practice areas, submarine exercise areas and firing danger areas. There are three main concentrations of PEXAs in England's waters – the South West, the North West and the North East. Many of the PEXAs are only used occasionally, and for the most distant offshore areas in the South West they can constitute the only clearly defined active sea use.

Many of the practice areas in the marine zone in East Anglia are used for mine laying and mine counter measure exercises. Another off the south–east Cornwall coast is used for live firing exercises. Public access across these areas is only restricted during active exercises.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type include:

- Army bases and barracks
- Radar bases and listening posts
- Firing/rifle ranges
- Naval docks and bases
- Submarine bases and exercise areas
- RAF bases

Before the mass mobilisation responding to the French Revolutionary (1792-1802) and Napoleonic Wars (1803-1814), soldiers and marines were usually housed within the structures that they garrisoned or close to naval bases. The massive increase in the number of military personnel after this point necessitated a widespread programme of barrack building, largely to a standard construction. Many of these were subsequently abandoned after the conclusion of the Napoleonic Wars. The invasion scares of the 1850s led to further military construction, this time with more of an emphasis on the provision of facilities for military families (Bone and Dawson 2008, 248).

Towards the end of the 19th century the advent of the railways and reforms aimed at stationing troops within population centres with the aim of fostering connections and boosting recruitment meant that barracks were no longer required to be located in areas vulnerable to enemy attack, for example the south coast (Bone and Dawson 2008, 248).

Formal naval facilities were established at Harwich in the 1650s and Devonport in the 1690s with the construction of the dockyard. The Devonport yard and its associated facilities expanded throughout the 18th and 19th centuries, becoming, with Portsmouth, one of the two largest naval bases in the country. In addition to the dockyard, facilities included a watering point, victualling stations (most notably the Royal William Yard), hospitals, gunpowder mills, and powder magazines. These were dispersed along the coastline fronting Plymouth Sound (Bone and Dawson 2008, 246).

During WW1, the Defence of the Realm Act enabled vast tracts of land to be requisitioned for camps, airfields, munitions production, and storage. This included re-establishing Harwich as a naval base, sheltering the destroyers of the Harwich Force. Half a million people were stationed in England as a home defence force, and coastal defences were greatly extended. Much of the training of the army took place across the English Channel, or on battle fronts. Some troops practised the construction of

fieldworks for trench warfare, which left distinctive features on the landscape which can still be found today.

At the outbreak of WW2, under the Defence Regulations, the power to requisition and make use of land was given to service and civil departments. In 1944, at the peak period of the militarisation of the landscape in England, around 11½ million acres (4.6 million hectares) was under some form of military control.

As a result of these processes, the character of certain areas of the country became dominated by military facilities, for example the numerous airfields and bases of East Anglia. In recent years as the international political context has changed many of these facilities have been abandoned and in some cases re-used. A good example is the Orfordness base, which was used by the military from 1915 as a result of its isolated nature. The area was initially used as an airfield, an experimental station and a prisoner of war camp. After WW1 'the Ness' continued to be used for experimental flying and then as a general experimental facility and featured in the development of radar. The facility was used in WW2 as a training ground. However it became most significant during the Cold War when it was an atomic research establishment, developing the firing mechanisms for nuclear devices. Following the end of the Cold War Orfordness was bought by the National Trust and is now run as a nature reserve.

VALUES AND PERCEPTIONS

Recent military installations are usually perceived as State interventions in the landscape for national strategic reasons. This Character Type controls specific areas across the country dominating the landscape physically (through warning signs and security devices, sometimes highly intrusive in the landscape such as fences) as well as psychologically. Within some otherwise popular areas of the English coast, access is restricted due to firing, the Lulworth Range in Dorset being a good example.

Some of the more specialised military facilities have gained an air of mystery, most notably Orfordness in Suffolk. Its series of unusual structures and the isolated nature of the area, in addition to its long period of closure, has created an enigmatic feel for this disused facility.

Orfordness also exemplifies the maritime value of such facilities as its structures, including its highly visible radio masts, are important navigational aids in an otherwise featureless area of coast.

Elsewhere, extensive former military facilities situated in or near urban areas may offer redevelopment opportunities which use the former military fabric as a prestigious design feature, almost a pre-defined brand asset for the future development, a good example being the mixed-use redevelopment of the Royal William Victualling Yard in Plymouth.

RESEARCH, AMENITY AND EDUCATION

As defence installations, while in active use they are generally kept secret with restricted public access if any at all. However, recently decommissioned military sites and such features from earlier periods have received considerable prompt attention from military historians. Military installations and their history are understood as part of the nation's local, regional, national and international past and present. The inherently competitive nature of warfare means that technology and its material expressions change rapidly in this particular sphere of human activity. Therefore, there is scope for further detailed and comprehensive archaeological research complementing both land and maritime perspectives. While operational, there will be little or no potential for amenity use but once decommissioned, military sites have considerable potential, being dramatic and 'exotic' at the same time. Those uses for public amenity may well compete with government needs to maximise financial returns from the land by disposing of it for development.

Programmes such as the Defence of Britain project (DOB), the National Mapping Project (NMP) and the Rapid Coastal Zone Assessment Surveys (RCZAS) have begun to record these facilities in locations where they may have otherwise been overlooked or forgotten.

Disused facilities have sometimes been put to educational and functional use, as seen at Orfordness which houses displays relating to its military use as well as providing a valuable amenity for eco-tourism and wildlife watching.

In terms of formal education, this character type is particularly relevant to the Secondary National Curriculum for history and geography, providing local, regional and national foci for studies of British, European and World History.

CONDITION AND FORCES FOR CHANGE

The Ministry of Defence and the armed forces themselves acknowledge the need, and take active responsibility for, maintaining historic features on their estate. The modern components are usually well–maintained while in use, although earlier features are vulnerable to alteration or removal by changes in current installations.

In the post Cold War period, the international political context has changed dramatically, as has the availability of training areas beyond the UK, and funding for the nation's defence. As a result of policy changes and defence reviews, many military needs served by these facilities are no longer supported, leading to their widespread decommissioning. With the government needing to maximise financial returns from this land, there are strong economic motivations to clear the remains of former military facilities and dispose of the land for redevelopment. This is especially true where the facilities are deemed to have little aesthetic value but which may nevertheless hold substantial historic evidential value which will need expert advice to elucidate.

A particular issue identified by the Ministry of Defence is the disposal of litter, rubble, spoil, and military equipment. The excavation of pits to dispose rubbish an intrusive activity which may impinge upon otherwise intact earlier deposits, especially as many coastal military training areas occur in areas also containing extensive surviving prehistoric and historic landscape features (Fulford 1999).

RARITY AND VULNERABILITY

This Character Type's occurrences for HSC are mostly scattered along the coasts of southern England and East Anglia, contributing strongly to landscape character as they tends to extend across discrete, often large, areas with a frequently high-profile sensory presence. Whatever one's perceptions of these areas, their decommissioning may inevitably lead to rapid character change which will vary according the form, age and design of the facility and its potential for re-development. Examples where redevelopment has recognised the development asset value of the facility itself, as at the Royal William Yard in Plymouth, may be rare but could be more widely adopted if more imagination, understanding and sensitivity was exercised, recognising the various conservation values embodied by such facilities as they become redundant.

A particular issue has been the availability of a sufficient window of accessibility for historic environment specialists' recording and recommendation needs between a facility's announcement of decommissioning and proposals for actual closure and clearance for redevelopment. Improved understanding and communications between heritage professionals and the MoD would help resolve that.

PUBLISHED SOURCES

Bone, M, and Dawson, D, eds, 2008. *Post-Medieval, Industrial and Modern* in C J Webster, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council, 213-68

Fulford, M, ed, 1999. *England's Coastal Heritage. A Survey for English Heritage and the RCHME (Archaeological Report)*, London: English Heritage

Tapper, B, Johns, C, 2008. *England's Historic Seascapes. Consolidating the National Method. Final Report*, Truro: Historic Environment Service, Cornwall County Council on behalf of English Heritage

WEBSITES

http://www.britarch.ac.uk/projects/dob/review/index.html

http://thesaurus.english-heritage.org.uk

1.1.8 Broad Character: Settlement

1.1.8.1 Character Type: Settlement

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Settlement includes the following Sub-types:

- Town
- Village

This Character Type relates to contiguous areas dominated by built structures serving various human activities including habitation. The range of activities beyond habitation, and extent of associated infrastructure, varies considerably.

The application of settlement terminology also varies enormously across England. A good example is provided by the differing applications of the term 'village' in areas of nucleated and dispersed settlement patterns and, partly related to that, the considerable sub-regional differences in the scale of settlement to which the term 'village' is considered appropriate. Relativism in application nationally is probably inevitable across HSC around different parts of the coastline and is not necessarily to be deprecated: it reflects regional and smaller scale differences in settlement perception.

So accepting there will be such differing perceptions of the terms around the coasts, fairly bland and relativist definitions are seen as entirely appropriate here:

A 'town' is an assemblage of public and private buildings, larger than a village and having more complete and independent local government (http://thesaurus.english-heritage.org.uk/).

A 'village' is a collection of dwelling-houses and other buildings, usually smaller than a town with a simpler organisation and administration (http://thesaurus.english-heritage.org.uk/).

The term 'settlement is generally used in disciplines such as archaeology, landscape history and other subjects to define a permanent or temporary community in which people live but along with that function is the potential for an enormous range of other socio-economic activities too, all of which may leave material imprints, whether or not structural. A settlement can therefore range in size from a small number of dwellings grouped together, to larger cities with surrounding urbanized areas. Settlement development can be based on analysis of archaeological or historical sources including, for the latest periods, historic Ordnance Survey maps; aerial photographs and local history.

In the context of HSC settlements are included where they are considered to be of maritime character. Coastal towns and villages often at least partially make their living from the sea and are inexorably linked to it as a consequence of their location.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type include:

- roads and trackways;
- enclosures;
- field systems;
- boundary banks and ditches;
- ponds, parks and woods;
- mills;
- manor houses, moats and churches, amongst others.

Settlement is a complex Character Type with different and numerous historical trajectories contributing to its present form. Therefore it is characterised by change and complexity but also strong elements of continuity. The variability of this Character Type is extensive, from region to region and from major metropolitan areas such as London, to tiny villages providing shelter for boats during stormy weather.

During the Neolithic period, the introduction of domesticated crops and animals had a profound effect on the development of settlement, land use and the landscape, intensifying changes already apparent in the preceding Mesolithic period. Pollen analysis has indicated phases of clearance, regeneration and further clearance. In some places, clearance was followed by soil deterioration initiating a process of degradation that was never reversed in some areas whose topography produced of conditions of high rainfall and exposure. The present open higher moorlands of Cornwall, Devon, Somerset and Yorkshire are a product of this combined effect of human management and topographic form, an effect particularly apparent from the Bronze Age onwards (Aston 2000, 23).

During the Roman conquest, many new features were introduced to the landscape and new types of settlement appeared. Formal roads were built with military precision. Military forts were an innovation to the English landscape. Many, but not all, larger Roman towns seem to have developed from earlier forts, reflecting Roman strategic and tactical decisions. The introduction of the monetary system and the existence of markets in towns contributed to develop a more commercial economy in some areas. In late and post-Roman periods, the infrastructure enabling this commercial economy was disrupted and abandoned, returning to its former subsistence level (see Aston 2000). Large areas of former Roman towns appear to have fallen into neglect, developing black earth deposits over debris from previous floors and buildings.

Medieval English coastal towns and villages generally comprised fishing communities using small harbours, often little, if at all, protected by artificial harbour walling. Others sited on tidal rivers (often now silted) were trading centres. Most currently extant buildings in such settlements (except churches) are post medieval or modern. Some settlements were also built on shipbuilding industries and naval centres. Medieval coastal towns were often prosperous as a result of their proximity to the sea and their ability to therefore control trade and exchange.

During the post-medieval period settlements grew slowly at first. During the later 18th century, many coastal settlements started to rapidly expand with increased industrial activity and the growth of commercial activities. As a result, several new towns and industrial villages also grew up along the coast. The housing in these small communities was normally provided by the owners of the industrial enterprises who also built schools, hospitals, and chapels. The houses were often built in terraces with an allotment to the rear of the house. Rows of terraced houses can still be seen in many English coastal villages today.

The arrival of railways in the 19th century also encouraged the development of many coastal towns and villages, both by allowing their accessibility to tourist visitors and by enabling marine and coastal resources, notably fish for food, to reach large inland markets. By the 20th century, some towns and villages were created purely to house

visitors such as Thorpeness in Suffolk. This mock-Tudor and *faux*-Bavarian village was the creation of a local landowner (Glencairn Stuart Oglivie) in the early 20th century who created a central mere by damming part of a tidal delta.

In the later 20th century, most coastal settlements also expanded through the provision of housing estates for local families and new residences for a growing population of retired people and people wanting second or holiday homes (e.g. in Cornwall and East Anglia). Many of England's coastal settlements are now largely residential or serve the tourist industry after their former industrial, harbour and port functions have died away.

Before the end of World War Two, many coastal settlements lacked basic, modern, sanitary amenities. Many of them were tenement buildings erected in the second half of the 18th century to accommodate the influx of labour to work in the shipyards, graving docks and ironstone mines (Frank 2002).

Today, England's coastal settlements vary greatly in form and function but all of them have a variety of building types from a range of periods, different sectors for residence, commerce, industry, storage, recreation, burial and ceremonial uses. Some settlements also have military remains (from medieval castles to 20th century pillboxes) and most settlements have at least some areas of rich subsurface remains with the footings of past buildings and features of medieval or earlier periods.

VALUES AND PERCEPTIONS

There is an abundance of documentary sources stretching back at least three hundred years for most English coastal settlements but material remains, whether visible or buried archaeologically, may well date back far further to the early historic or prehistoric origins of the settlement. Influences from these settlements' past development may also be reflected in the street plans, market places, and surviving medieval buildings (e.g. castles and churches). Street names may also reveal now lost features or activities (e.g. Far Jetticks, Friarage Field, Iron Scar and Whale Hill amongst others). The discovery of artefacts and features encountered during developments and roadworks in towns represent a reminder to the observant dwellers of the richness of their town's past.

Coastal towns and villages also have important roles for mariners, not only as destinations and economic opportunities but also as distinct places signifying their position along the coastline or relative to inshore hazards. They are also watering and supply places, providing a breadth of necessary facilities and social life.

RESEARCH, AMENITY AND EDUCATION

Settlement patterns have been researched from many perspectives and these studies vary immensely. Of particular relevance is the work by Stuart Roberts and Brian Wrathmell (2000) characterising England's rural settlement patterns, of which patterns of coastal settlement form a distinct subset. Sociologists and historical geographers have also extensively researched patterns of urbanisation and urban regeneration. Smaller settlements have also seen dramatic changes throughout the 20th century whose drivers and present landscape/seascape effects and economic contexts are ripe for research using methods such as postcode address file analyses.

In rural settlements, extant buildings and the layout of surviving features are open to further study. In many cases, there will be a wealth of subsurface settlement remains, perhaps dating back to later prehistory. The study of documentary resources will complement archaeological studies, both shedding light on the history of the development of settlements in England.

Towns and villages are generally highly influential aspects of coastal landscape and seascape character. Their wealth and great variety of historical and archaeological components demonstrate considerable time-depth and contribute strongly to their area's appearance and character. This has potential for further archaeological and

historical research as well as the development of education and outreach initiatives. Education and outreach initiatives for this Character Type can be particularly popular when based within local communities, focusing on their own town or village. Towns and villages are also attractive amenity elements, being often used by the tourist industry.

CONDITION AND FORCES FOR CHANGE

Although settlements, as hubs of human activities, go through continuous change, the layouts and historic fabrics of most of them in general are relatively well preserved, shedding light about the history and development of these settlements.

As places where people live and undertake their business, settlements will always have a dynamic nature. The creation of new means of transport such as roads, railways and sea transport such as ferries is a key area for large scale developments, often changing the character of towns and their immediate surroundings.

Many coastal settlements have declined since the later 20th century due to the popularity and more assured weather conditions of foreign holidays. In addition the expansion of ports and increased development can affect the character of nearby coastal towns, turning some into 'dormitory' suburbs of larger urban areas.

Today, the decline of the commercial centres of many towns in England, as out-of-town superstores take their toll, is perceived by most people as a negative force for change, removing traditional businesses and gradually taking away the meaning from these places.

A number of towns and villages are affected severely by coastal erosion. Policy towards addressing this is the responsibility of the Environment Agency but to ensure heritage considerations are fully informed and presentable, assessment work such as fine grained HSCs can complement surveys and recording by the English Heritage Rapid Coastal Zone Assessment Surveys (RCZAS).

RARITY AND VULNERABILITY

Towns and villages are frequent around most of our coastline and make strong and varied contributions to the seascape and landscape. They are vulnerable to change as are all of our settlements, with particular aspects applicable to them from the economic decline of the tourist industry and the effects of coastal erosion.

Subtle aspects such as street layouts and unusual features of, for example, buildings relating to commercial, social and religious concerns, may be easily overlooked and are thereby vulnerable but important for maintaining links with settlement origins and development as well as for enhancing local distinctiveness.

In many coastal settlements, historically and architecturally important structures are often designated as Listed Buildings. Similarly nationally important archaeological features may be designated as Scheduled Monuments. Conservation Areas also exist in most towns, generally in the historic cores. Local Plans reinforce these planning controls. The Historic Environment Record (HER)/Sites and Monuments Record (SMR) for towns are gradually improving but most HERs/SMRs still need to undertake a systematic reassessment of urban archaeological remains. Some settlements will also fall within areas covered by broader designations such as Heritage Coasts, National Parks or Areas of Outstanding Natural Beauty (AONBs).

PUBLISHED SOURCES

Aston, M, 2000. *Interpreting the Landscape. Landscape Archaeology and Local History*. London: Routledge

Frank, P, 2002. *Yorkshire Fisherfolk.* Bodmin: Phillimore

Petts, D, and Gerrard, C, 2006. *Shared Vision. The North East Regional Research Framework for the Historic Environment*. Durham: Durham County Council

Roberts, B K, and Wrathmell, S, 2000. An *Atlas of Rural Settlement in England*, London: English Heritage

WEBSITES

http://www.ironstonemuseum.co.uk/ironstoneindustry.htm

http://www.roman-britain.org/places/pons_aelius.htm

1.1.9 Broad Character: Recreation

1.1.9.1 Character Type: Recreation

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Recreation includes the following Sub-types:

- Aquarium
- Bathing/swimming
- Recreational dive area
- Golf course
- Holiday park
- Leisure fishing
- Leisure sailing
- Marina
- Parks and gardens
- Seaside entertainment
- Sports facility
- Wildlife watching
- Promenade
- Pleasure pier
- Leisure beach
- Recreational open ground

'Recreation' refers here to areas whose dominant character arises from activities whose primary purpose relates to leisure, pleasure, or inspiration. This broad definition includes areas devoted to a considerable diversity of coastal and marine specific tourist and leisure activities whose commercial income forms a very important sector of the coastal economy. But it also includes areas dominated by less directly commercial aspects, such as those frequented by wildlife watchers, and areas given over to extensive public art installations such as Antony Gormley's '*Another Place*' art installation on Crosby Beach.

An 'Aquarium' is an area of buildings, artificial ponds and/or tanks in which aquatic plants and animals are kept for observation and study (http://thesaurus.englishheritage.org.uk/).

A 'Bathing/swimming area' is as it states; used by people predominantly for bathing and/or swimming however, for the exposed coasts of Cornwall and Devon, and for more limited parts of the North East and Yorkshire, surfing and wind surfing are important further components of bathing/swimming areas.

A 'Recreational dive area' is used by recreational divers, sometimes focussing on wreck sites and other aspects of the cultural topography and historic environment interest.

A 'Golf course' is a prepared area of ground used to play the game of golf on (http://thesaurus.english-heritage.org.uk/).

'Holiday park' refers to areas dominated by commercial complex(es) encompassing lightly-built holidaymaker's accommodation and associated facilities, sometimes including entertainment areas. These areas include self-contained complexes often styled 'holiday parks' but also caravan parks and aggregations of chalet accommodation.

A 'Leisure fishing area' is used for recreational fishing and angling.

'Leisure sailing area' refers to areas used for recreational sailing, yachting, and other small craft pursuits.

A 'Marina' is a dock or basin, often inland, used for mooring yachts and other small pleasure craft (http://thesaurus.english-heritage.org.uk/).

'Parks and gardens' refer to parks and garden areas used for entertainment and relaxation, but only those assessed as having a distinctly maritime character are included in HSC, otherwise they are of relevance to HLC alone.

'Seaside entertainment' refers to areas dominated by commercial facilities, such as amusement arcades and fun fairs, used for entertainment by coastal visitors.

'Sports facility' refers to areas whose dominant character comprises provisions for sporting activity, whether or not commercially provided, and whether or not in areas of purpose-built structures. Only those assessed as having a distinctly maritime character are included in HSC, otherwise they are of relevance to HLC alone. So in HSC these may include, for example, land-based sporting facilities aimed specifically at coastal holidaymakers or areas regularly used for water-sports and often designated as such.

'Wildlife watching' refers to areas whose character is dominated by the recreational observation of wildlife, for example, areas regularly frequented by bird-watchers, boat trips to observe seals or cetaceans, or underwater nature trails.

'Promenade' refers to a designed open space within or extending from a settlement area, usually linear and specifically intended for strolling and public walks. Such promenades are often associated with good coastal views and commonly form part of the planned complex of facilities of a coastal resort.

A 'pleasure pier' is a raised platform, generally of iron and/or wood, supported on spaced pillars or props and projecting out into the sea and designed to provide primarily recreational access over the sea from the shore to an adjacent position near or below the mean low water level. Pleasure piers varied in size and complexity, but are commonly support buildings providing light entertainment facilities and some incorporate embarkation points at their end and/or along their sides for ferries and pleasure shipping.

'Leisure beach' refers to inter-tidal areas, predominantly of sand, used mostly for leisure and relaxation by coastal visitors. A leisure beach may have a range of directly associated built facilities and may be managed actively by, for example, periodic scraping or beach replenishment, or passively by groynes, to retain the sand cover.

'Recreational open ground' covers open areas characterised by a principal use for public access and recreation. Any agricultural management of these areas is secondary and used as a tool to maintain the land's suitability for public recreation. Recreational uses of this land may include long distance footpaths, areas for the display and presentation of historic features, rural designed landscapes open to the public (but only where the design has a specifically maritime character), and areas of coastal land set aside for public appreciation of the maritime and coastal landscape.

Recreational appreciation of the coast has a relatively long history in England with origins in the earliest expressions of the Romantic movement. As such, areas dominated by recreational character today are likely to have had a number of previous

recreational expressions in some areas. Later and current themes affecting the expression of 'Recreation' include the post-1950s decline of the English seaside resort and various current initiatives aimed at regeneration. Those recreational activities that have a maritime flavour could be exemplified by the gardens of many coastally-situated large houses open to the public, which are designed specifically to make use of the coastal topography and which display or shelter coastally-specific plant species. Similarly, golf-courses utilising coastal sand dunes rely for their physical existence on coastally-specific dune formations and for their economic existence by drawing on the coastal tourist trade.

Tourism is an important source of income and employment for many coastal regions and towns in England, Blackpool, Brighton, Scarborough, Clacton, Southend and Torquay being some well-known examples. The coastline attracts many people in pursuit of open-air leisure activities and many of these places have been visited historically for such purposes. Those visits have often prompted further commercial and visual attractions: Blackpool, for example, has been visited for well over a century because of the famous Blackpool Tower, its piers and seaside entertainment fun parks. Coastal recreational areas encompass a huge diversity, from small villages and high cliffs, to clear water and sandy areas offering a wide range of open-air leisure activities.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Typical components of this Character Type involve, amongst others, walking, bird watching, sunbathing, golfing, climbing, camping, wildfowling, sea bathing, sailing, surfing, wind surfing, diving, leisure fishing, angling, water and jet-skiing.

Outdoor swimming pools, whether roughly created among inter-tidal rock formations or more formally built as 'lidos', were a recreational feature in some English coastal resorts. These pools were seen, especially in the 1930s, as a modern day 'improvement' on the 'health-giving' dips in the sea which first became popular with the aristocracy, but later used by the wider population.

Other coastal amenities in England include beach donkey rides, aquariums, pleasure gardens and parks. The cliff gardens and parks, with their walkways, boating lakes, fountains, flowerbeds and bowling greens, were appreciated for their peace and tranquillity.

Although golf has a long history extending back to the medieval period in Scotland, it appears to have been the installation of James VI of Scotland as King of England in 1603 that provided the impetus for the spread of the game south of the border. The first club outside Scotland, the Royal Blackheath, was not formed until 1766 but it is believed that the game had been played here since 1608. The first 18-hole golf course was constructed in 1764 and since then many have been built, often in coastal locations, particularly following the growth of the railways in the 19th century (http://www.golfeurope.com/almanac/history/).

Coastal resorts providing recreational activities developed in the 18th century as wealthier members of society began to appreciate the healthy air and relaxation of the seaside and many bought summer homes on the coast. This was boosted by the arrival of the railways and higher levels of income among the middle classes in the 19th century (Williamson 2005, 141).

The diversity of marine recreational activity has increased dramatically in the 20th century with advances in technology and global interconnectivity. Two major developments were the development of the aqualung in the 1940s and wetsuit in the 1950s leading to the development of recreational diving (http://en.wikipedia.org/wiki/Recreational_diving). For Britain's cold waters the development of the wetsuit was fundamental in allowing more people to spend more time in the water. Surfing was introduced via contact with Australian and American visitors to Cornwall and the Channel Islands, often via surf life saving clubs. However,

Cornwall already had a history of belly boarding on small wooden boards (http://www.originalsurfboards.co.uk/index.php).

The development of landscape heritage conservation measures in the later 20th century was applied to specifically coastal landscape too. A 'Heritage Coast' designation was initiated in 1972 to highlight the special scenic and environmental value of some stretches of coastline when development proposals are under consideration.

The 20th century saw the rapid development of the 'heritage industry' too. Coastal heritage sites and facilities in England, such as abbeys, castles, cathedrals and churches, the countryside, historic houses, Roman remains and museums are increasingly being used to promote tourism as well as increasing awareness about our common heritage.

VALUES AND PERCEPTIONS

Coastal recreation and water related activities have a number of positive outcomes, including health benefits, greater social inclusion, cohesion and quality of life, environmental protection and economic benefits (Church 2008). Many recreational activities such as swimming, rowing, canoeing, dinghy sailing and other activities that require sustained physical exertion are considered highly beneficial to achieve a healthy lifestyle.

Greater social inclusion and cohesion may be fostered through travel and recreation as a means of developing new social networks, acquiring knowledge and skills and gaining a sense of achievement whilst having fun.

In some regions of England, local authorities, including National Park authorities and other organisations, successfully manage a high level of water related recreation activity in very sensitive environmental sites using a wide range of tools such as permits, short closures and codes of conduct (e.g. the counties of Norfolk, Suffolk, and Essex, amongst others). This has shown that well-managed water-related recreation can happen alongside, and sometimes contribute to, sensitive environmental areas. As an example, angling organisations, landowners and private sector operators have all worked in partnership with the regulator, the Environment Agency to contribute to a significant increase in the availability and quality of riverine game-fish habitats (Church 2008: 7).

The economic benefits of recreational activity are closely related to those of the tourist industry, which is beneficial as a source of income as well as employment. This Character Type also stimulates consumer spending of sport related goods.

Recreation is perceived as an economic resource: a source of income and employment, but also as a means of providing a better lifestyle, hence it is highly valued for its contributions to the society as a whole.

RESEARCH, AMENITY AND EDUCATION

Recreation and tourism have had a profound impact on economy, infrastructure and social structure of England since the late 18th century. Further research of this Character Type could focus on a better understanding of the contributions of the tourist industry, past and present, to local coastal distinctiveness. Also to creating more effective tools to enable the prediction of tourism impacts from proposed developments.

Much recreation itself is essentially about various forms of human enjoyment of landscape and seascape as an amenity, whether simply perceived or artificially packaged and presented by public or private providers.

CONDITION AND FORCES FOR CHANGE

Coastal recreation plays increasingly significant and varied roles in the coastal and seascape perceptions both of tourists and coastal communities. Today, tourism is one of England's most important industries but cheaper and more attractive climatic

conditions offered by easily available package holidays to the Mediterranean and beyond have put economic pressure on many seaside towns, although many of them are finding ways to regenerate, reinvent and re-launch themselves.

The UK Government has previously treated it as a national priority to promote sport and recreation in general as a means of improving people's health and quality of life. This has combined with the economic drivers for promoting the tourist industry in recent years in raising the profile of England's coastal recreation, sports in particular. Part of that has been a demand for better access to the coast itself, to which the 'England's Coastal Access' provisions are a response in the Marine and Coastal Access Act 2009.

Coastal recreation and the tourist industry in general require an infrastructure to be in place to enable their access and success, such as roads, footpaths, car parks and hotels. The development of these infrastructures and the activities of tourists, for example, can have major effects on the very historic cultural landscape/seascape that people live in or travel to enjoy. These effects can be summarised as: 1) offering positive opportunities to put provisions in place to increase public awareness, respect and enjoyment; 2) creating pressures for change and impositions on the present land/seascape, for example through new developments, signage, or increased visitor numbers, which some may welcome for the economic benefits but which others may perceive negatively.

RARITY AND VULNERABILITY

In character terms, recreational use has long been a major formative aspect along much of England's present coastline. Refurbishment and updating inevitably put pressure on earlier features but this is part of the ongoing change present and necessary everywhere. It needs to be managed and accommodated in the same ways too, with knowledge and sensitivity regarding those aspects from the past that lend distinctiveness to places or which are judged by society (at many levels) to be rare or otherwise special. The latter may or may not be formally designated, but planning constraints on development initiatives in coastal areas also exert some control on the locations and forms of proposed recreation complexes.

Diving clubs that dive on previously unknown wrecks could potentially provide local archaeologists and historians with a wealth of new and valuable information on these sites. Encouraging collaboration between local divers, archaeologists and historians would provide opportunities to continue developing general public awareness. Recent initiatives from the Nautical Archaeology Society (see http://www.nasportsmouth.org.uk/index.php) and the Hampshire and Wight Trust for Maritime Archaeology (www.hwtma.org.uk) provide some examples.

PUBLISHED SOURCES

Church A. 2008. *A Strategic Plan for Water Related Recreation in the East of England - Draft*, Brighton: University of Brighton

Fulford M, Champion T, Long A, eds. 1997. England's Coastal Heritage: A Survey for English Heritage and the RCHME. *RCHME/EH Archaeological Report* **15**, London: EH/RCHME

WEBSITES

http://www.naturalengland.org.uk/ourwork/conservation/designations/heritagecoasts/default.aspx

www.britainexpress.com/Where_to_go_in_Britain/tour/ne.htm

http://www.nauticalarchaeologysociety.org/content/adopt-wreck-scheme

http://www.hwtma.org.uk/edout

http://www.brighton.ac.uk/waterrecreation/project_overview.htm

http://canalrivertrust.org.uk/

http://www.golfeurope.com/almanac/history/

http://en.wikipedia.org/wiki/Recreational_diving

1.1.10 Broad Character: Cultural Topography

1.1.10.1 Character Type: Palaeolandscape Component

INTRODUCTION/DEFINING DISTINGUISHING ATTRIBUTES

The Character Type Palaeolandscape includes the following Sub-types:

- Palaeolandscape component
- Palaeochannel
- Submerged forest
- Peat deposits

This Character Type includes surviving areas of ancient topographic features of former exposed land with evidence of strong potential for associated palaeoenvironmental deposits and/or old land surfaces. Many are areas that were once dry land at times of low sea level during the glacial periods and within several millennia to either side of them, when much water was locked up in the ice sheets. The relevance of these to HSC is as areas of former human habitat whose past topographic and ecological regimes shaped early human cultural activity and the perceptions it reflected, as well as our present understandings of those past landscapes. In intertidal or marine contexts, these will now mostly be submerged beneath the sea, buried beneath post-transgression sediments or buried deep in the muds and silts of estuaries and rivers. Part of this Character Type includes submerged forest remains recorded in some intertidal and inshore areas.

'Palaeochannel' refers to the course or channel of a river or stream preserved as a geological feature (http://thesaurus.english-heritage.org.uk/).

Submerged forest refers to tracts of submerged land retaining macrofossil evidence, often in situ, for former woodland and other woody vegetation cover. Submerged forests are strong indicators of submerged early land surfaces and contain important information relating to past human activity and habitats.

Peat deposits comprise unconsolidated semi-carbonised plant remains formed in freshwater-saturated environments. As a Sub-character Type, peat deposits refer to those formed in earlier periods and may be exposed by erosion on the land, intertidal or sea-floor surface, or they may be buried beneath later deposits. Their excellent preservation of organic remains gives peat deposits a particular importance in understanding past environmental conditions but they also have a vital role in terms of cultural landscape perception. They reflect areas of former bog which was often at the margins of the regularly visited and territorially familiar, a position ripe for endowment with spiritual significance and enhanced by a special reverence for water evident in early religions. Many ritually deposited items and hoards, and human bodies, have been found in peat deposits. Other, possibly more functional, artefacts include prehistoric trackways, such as those found on the Somerset Levels. Later cultural activity includes cutting and drying of peat for fuel, often the subject of the specific right of 'turbary' on common land, and in more recent times, industrial-scale peat extraction for garden soil enhancement. Many areas with rich peat deposits are now areas enjoyed recreationally by walkers and others.

HISTORICAL PROCESSES: COMPONENTS, FEATURES AND VARIABILITY

The earliest dated evidence for human activity across north west Europe was recently pushed back to 950,000 BP by discoveries of exposed sedimentary sequences at

Happisburgh and Pakefield on the coast of Norfolk and Suffolk. For all glacial periods there is potential for archaeological material deposited in sediments on the continental shelf. For example, Pleistocene fluvial, glacial and periglacial and beach gravels form much of the Palaeolithic archaeological record. Furthermore, Late Devensian and Holocene gravels provide much of the buried archaeology of valley landscapes (Brown 2004). Processes such as climate change and the fluctuation of sea levels, particularly those resulting from glaciations, over the last 2 million years have contributed to the deposition of sand and gravels which now lie on the seabed (Gubbay 2005). These materials were originally deposited by river systems that are now submerged (BMAPA 2000; ODPM 2005). These processes periodically exposed the seabed as dry land, creating a space for human occupation and the potential for associated archaeological evidence. Hence, the potential of survival of palaeolandscapes in marine deposits in and off English waters is immense. Fulford *et al* (1997) mention that 'recent interest in the potential of underwater landscapes around England was stimulated in part by an audit of the English coastline in 1997 which recorded coastal prehistoric peat deposits that were seen to follow ancient river systems extending offshore'; this makes reference to the rich source of Mesolithic material from the Solent area (e.g. Bouldnor Cliff) and the large number of finds found in Essex (Flemming 2004; Fulford *et al* 1997: 108; Momber 2004). More areas have been discovered since then, off the Humber being an example. Furthermore, there are confirmed examples of prehistoric sites in the intertidal zones from Neolithic and Bronze Age in England (e.g. Wootton Quarr and Langstone Harbour) stressing the historic character of these submerged landscapes. Fleming (2002) also identified a series of hotspots for palaeolandscape including fossilised river valleys, cliff coasts, estuaries, wetlands, mudflats and peat deposits.

In addition numerous archaeological remains have been recovered offshore through processes such as fishing and aggregates dredging, indicating the presence of further landscapes. For example worked bones dating to the Mesolithic have been trawled up by fishermen around the Dogger Bank and Brown Bank areas off the east coast and a number of Palaeolithic hand axes were recovered from aggregate dredging area 240 off Great Yarmouth.

Given the current limited understanding and early stages of research regarding this Character Type, various considerations were emphasised by Dix *et al* (2008) when seeking to understand its components, features and variability:

- There is a spatial and temporal diversity of archaeological material that potentially exists in the submerged areas of the UK continental shelf
- Large scale patterns of land use are evident in the terrestrial record which are likely to be applicable to the submerged regions
- The present seabed is not an exact analogue of the ‘lowstand’ land surface
- The submerged prehistoric material is likely to exist in one of the following states of preservation: primary, secondary or tertiary context
- The research potential of secondary contexts for the Upper Palaeolithic and Mesolithic and tertiary contexts for all periods needs to be further examined
- The prehistoric potential of the submerged material goes beyond interpretations referring to ‘landbridges’ or migration corridors
- Areas identified for further research include the antiquity and importance of coastal exploitation, and human response to sea level change
- Effective interrogation and exploitation of the submerged archaeological resource will require secure and accurate landscape reconstructions
- A significant quantity of archaeological material will be reworked by marine processes. Understanding the processes behind this is crucial to our understanding of submerged landscapes and future work should address these processes in detail.

A more secure understanding of marine taphonomic processes may aid our understanding of the potential and location of marine secondary and tertiary contexts.

Completed in 2010 the Waterlands project was completed for the Marine ALSF to better outline a UK Management Indicator Framework for marine palaeolandscapes. The work was GIS based and included mapping the potential extent of former land surfaces in addition to an assessment for the potential for survival, significance and vulnerability (Goodwyn 2010).

VALUES AND PERCEPTIONS

Despite a long-standing tradition of research into coastal and marine landscapes and landscape perceptions in some areas, such as the Isles of Scilly (Thomas 1985), this has been limited. The maritime archaeological community has now started to recognise that maritime archaeology is not only concerned with shipwrecks but also prehistoric submerged landscapes. The archaeological potential that exists on the continental shelves has been recognised in the UK, especially through the Aggregates Levy Sustainability Fund (ALSF) projects (see http://ads.ahds.ac.uk/project/alsf/), due to raised awareness from the recent expansion of industrial concerns onto the shelf.

However, for the wider community, the wider archaeological potential of these submerged landscapes is still mainly unknown. The latent public interest in undersea archaeology is already evident from the popularity of television series focussing on shipwrecks. The need to extend this to submerged landscapes is now being addressed by work such as Natural England's '*Undersea Landscapes Campaign*' in 2008-9, and by considerable public interest which followed the screening of a Time Team special entitled '*Britain's Drowned World*' in 2007. Historic Seascape Characterisation itself can build on this interest by providing a resource relevant to everyone's familiar area of the coast and sea, and which can inform and be responsive to public understanding.

There is also a developing interest in palaeolandscapes within those sectors of society which regularly come into contact with the resource. In particular fishermen and aggregate dredgers who often recover artefacts such as stone tools and bone. The Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest funded by the ALSF is a clear expression of interest and support from the marine aggregates industry.

RESEARCH, AMENITY AND EDUCATION

Processes which periodically exposed the seabed as dry land created a space for human occupation and the potential for associated archaeological and palaeoenvironmental evidence. The potential of these marine deposits is therefore immense, and there is a need to enhance our understanding of these drowned landscapes and palaeoenvironments which are still relatively poorly understood. The significance of this potential is emphasised by the discovery of the stratified Mesolithic occupation site at Bouldnor Cliff (Momber 2004). To date, this is the only stratified prehistoric occupation site identified in UK waters. Additionally, there are submerged prehistoric landscapes and associated palaeoenvironmental material dating to the Neolithic and Bronze Age both off the Isle of Wight coast and off the New Forest, running for kilometres along the coast (HWTMA 2006, 2008). Remains of a submerged forest of St Mary's, Isles of Scilly, discovered in 2005, have recently been radiocarbon dated to the Late Mesolithic, a charcoal peak in the vegetation record could indicate woodland clearance by deliberate burning (Charman *et al* forthcoming). Today, these provide baseline information about the time-depth of those now submerged landscapes.

Since the end of the last glaciation, rising sea levels resulted in the inundation of many coastal areas that were once terrestrial habitats. These submerged landscapes are now a major focus of underwater archaeological investigation because they potentially contain a high proportion of the prehistoric record of human settlement on coasts (Flemming 2004; Quinn *et al* 2000; Sonnenburg and Boyce 2008). On an international scale, the palaeolandscapes of the North Sea are crucial to our understanding of human

development and periods of prehistory for which we have little evidence, as illustrated by the deposits uncovered at Pakefield and Happisburgh. The UK Continental Shelf is under intensive developmental pressure from a range of threats including mineral extraction and the direct impact of construction (Dix *et al* 2008). Because of these threats, further research will enable a deeper understanding of this Character Type before it is lost to future human activity or to erosion processes. Public awareness should also be raised through dissemination programmes which focus on these unique submerged landscapes.

Some academic research has begun to address this Character Type, including Southampton University's 'Reassessment of the Archaeological Potential of Continental Shelves' (Dix *et al* 2004) and Birmingham University's 'North Sea Palaeolandscape Project,' now being extended to other areas. The form and scale of palaeogeographic and palaeoenvironmental change of the UK continental margins is of particular relevance to the processes of reconstruction, as it can radically alter prehistoric and historic timescales. Therefore, there is a need to understand the character of the UK continental margins and the short- and long-term processes that affect them. In an ideal world research into submerged prehistoric landscapes would proceed on very small "local" spatial scales (studies in the order of tens of metres through to a few kilometres), thus allowing very fine details to be observed. These smaller scale studies could then be fed into larger "regional" overviews (10s to 100s kms). In practice, the realities of underwater work render such a bottom-up approach sometimes difficult to undertake mainly due to lack of funding invested in this type of research. It is also clear, as on land, that the pace of change and areas being subjected to current and future development pressure far outstrip any possible progress at such fine-grained scales. Historic landscape and historic seascape characterisation provide one response to this problem. Dix *et al* (2008) suggest that the majority of research on continental shelf archaeology will be undertaken on the regional scale, with only occasional, more detailed analyses of local scale studies being possible. In this sense, the adoption of a top-down approach could be used to maximise the regional data and, through appropriate analysis, utilise it to effectively target local detailed surveys (Dix *et al* 2008).

In terms of formal education, palaeolandscapes provide excellent case studies for cross-curricular work looking at environmental change and how it affects populations over time.

CONDITIONS AND FORCES FOR CHANGE

Since the last glacial maximum, rising sea levels submerged many areas that were once terrestrial habitats. These are under intense pressure from a range of developments including bottom trawl fishing, mineral extraction and the direct impact of construction. Specific threats range from the laying of pipelines to, more recently, the development of wind farms, the wider issues of mineral extraction and the extensive, generalised, impact of fishing and commercial trawling (Dix *et al* 2008). The cumulative knowledge that such developments are producing through Environmental Impact Assessments (EIAs) should enable a deeper understanding of this Character Type before it is lost to modern human actions and erosion processes.

The erosion-losses of unconsolidated cliffs from around many stretches of the English coastline are widespread and often rapid, but the change from wide-scale sedimentation to active erosion is less common. Pressures on this Character Type are also increasing with the erosion on the sea-floor of drowned soils that were once habitable land.

RARITY AND VULNERABILITY

Submerged Palaeolithic and Mesolithic landscape features are relatively rare in England, Bouldnor Cliff being an example (see Momber 2004). As such, these deposits are regarded as of national, and even international, importance. Wherever possible, advice is given by historic environment curators to leave these deposits undisturbed due to the

extreme fragility of peat deposits and associated faunal remains (and potential human occupation evidence such as structures). Furthermore, Neolithic and Bronze Age submerged landscape components are also relatively uncommon in England. Some examples have been found in areas such as the Solent as well as in tidal rivers and estuaries in England (e.g. Wootton Quarr (Isle of Wight), and Humber Estuary, amongst others). Prehistoric landscape remains in the intertidal zone are commonly exposed to eroding processes, giving a frequent emphasis on needs to monitor their exposures and record newly exposed ones, Wootton Quarry (Isle of Wight) and Langstone Harbour (Hampshire) being good examples.

Understanding the submerged prehistoric landscape components of the UK Continental Shelf is key to understanding the prehistory of Europe. Submerged prehistoric landscapes can survive with sufficient integrity to provide evidence for settlement patterns, working sites, fish weirs, hearths, food remains, craft and burials (see Flemming 2004; Momber 2004). Submerged prehistoric landscape features represent a nationally and internationally valuable resource holding evidence for how humans used and perceived these past landscapes, re-populated north west and northern Europe after the last glaciation, and adapted to the post glacial environment. They contribute to a more comprehensive understanding of the past and shedding new light on current issues including coastal and climate change.

Natural erosion processes occur along the English coast. However, some places are more severely affected than others (e.g. the coast of East Anglia). These processes appear to comprise the greatest vulnerability of this fragile Character Type.

PUBLISHED SOURCES

BMAPA. 2000. *Aggregates from the Sea. Drawing Strength from the Depths*. London: BMAPA

Brown, A, 2004. *The Achievements, Status and Future of Aggregate Extraction Related Archaeology in England*, Unpublished Report

Charman, D, Johns, C, Camidge, K, Marshall, P, Mills, S, Mulville, J, and Roberts, H M, forthcoming. *The Lyonesse Project: a study of the evolution of the coastal and marine environment of the Isles of Scilly*, Truro: Cornwall Council and English Heritage

Dix, J, Quinn, R, Westley, K, 2008. A Reassessment of the Archaeological Potential of Continental Shelves, Southampton: Southampton University http://archaeologydataservice.ac.uk/archives/view/continentshelves_eh_2008/,

Fitzpatrick, A, ed, 2008. Later Bronze Age and Iron Age in C J, Webster, ed, 2008, T*he Archaeology of South West England, South West Archaeological Research Framework Resource Assessment and Research Agenda*, Taunton: Somerset County Council, 117-44

Flemming, N C, 2002, *The Scope of Strategic Environmental Assessment of North Sea areas SEA3 and SEA2 in regard to prehistoric archaeological remains*. Department of Trade and Industry

Flemming, N, ed, 2004. Submarine Prehistoric Archaeology of the North Sea. *CBA Research Report* **141**. York: Council for British Archaeology

Fulford, M, Champion, T, Long, A, eds. 1997. England's Coastal Heritage: A Survey for English Heritage and the RCHME, *RCHME/EH Archaeological Report* **15**, London: EH/RCHME

Goodwyn, N, 2010. *Waterlands: Developing Management Indicators for Submerged Palaeoenvironmental Landscapes*, ABP Marine Environmental Research for the MALSF

Gubbay, S, 2005. *A Review of Marine Aggregate Extraction in England and Wales 1970-2005*, Report for The Crown Estate

HWTMA, 2006, *A Year in Depth. The Annual Report of Hampshire and Wight Trust for Maritime Archaeology 2005/2006*, Southampton: Hampshire & Wight Trust for Maritime Archaeology

HWTMA, 2008. *A Year in Depth. The Annual Report of Hampshire and Wight Trust for Maritime Archaeology 2007/8*, Southampton: Hampshire & Wight Trust for Maritime Archaeology, Southampton

Momber, G, 2004. Drowned and Deserted: A Submerged Prehistoric Landscape in the Solent, England in N FLemming, ed, 2004, T Submarine Prehistoric Archaeology of the North Sea: The Inundated landscapes of the Western Solent, York: *CBA Research Report* **141**, ed. N Flemming, pp. 37-42

ODPM. 2005. *Marine Mineral Guidance 1: Extraction by Dredging from the English Seabed*

Quinn, R, Cooper, A, Williams, B, 2000. Marine Geophysical Investigation of the Inshore Coastal Waters of Northern Ireland, *International Journal of Nautical Archaeology* **29**, 294-8

Sonnenburg, E, Boyce, J. 2008. Data-Fused Digital Bathymetry and Side-Scan Sonar as a Base for Archaeological Inventory of Submerged Landscapes in the Rideau Canal, Ontario, Canada, *Geoarchaeology: An International Journal* **23**, 654-74

Thomas, C, 1985. *Exploration of a Drowned Landscape*, London: Batsford

WEBSITES

http://www.abpmer.co.uk/Planning_Licensing/Maritime_Archaeology_/

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

http://en.wikipedia.org/wiki/Star_Carr

http://ads.ahds.ac.uk/project/alsf/

http://www.maritimearchaeologytrust.org/a2s

http://www.maritimearchaeologytrust.org/wootton

1.1.10.2 Character Type: Cultural Topography (Land)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Cultural Topography (landward) includes the following Sub-types:

- Cliff
- Dunes
- Lake, pond
- Reservoir
- Watercourse
- Wetland
- Lagoon

This Character Type refers to those aspects of cultural topography whose physical expressions occur predominantly to landward of Mean High Water and which possess various aspects of maritime cultural character.

A cliff is defined as a relatively tall, steep and largely exposed face of the local geological formation, usually of rock though in some areas cliffs may form from erosion of softer materials such as boulder clay. Cliffs are formed by the processes of erosion

and weathering and are frequent along coasts and rivers. Their form, appearance and profile vary considerably with their composition. Along much of southern England's coastline, cliffs are usually formed by sedimentary rocks such as sandstone, limestone and chalk, the White Cliffs of Dover (chalk) being a well-known example. In south western England the hardness and jointing patterns of igneous and metamorphic rocks, such as the granite, serpentine, and slate of Cornwall, can form completely different cliffscapes. In East Anglia cliffs are primarily formed from clay and sand, making them very soft and subject to rapidly erosion. Cultural aspects of cliffs include their use as vantage points for the military and for maritime safety lookouts, and recreational uses such as rock climbing and coastal walks. Many have provided ready opportunities for quarrying and other extractive industries. Many distinctive cliffs have specific names and serve as familiar coastal landmarks for users both of the sea and land.

Dunes refer to areas containing hills or ridges of unconsolidated wind-blown sand. The surface of many of the ridges and the intervening slacks may or may not be stabilised by surface vegetation. Cultural aspects of coastal dunes include settlement features and ancient land surfaces sealed by the onset of dune formation and, in some cases, their preservation of sequences of prehistoric and later land surfaces within their fabric during their long development. Their tendency to occur behind landing beaches often produces extensive military defences and structures within dune systems, while the remoteness of some extensive dunes has been used for explosives works such as those at Hayle Towans, Cornwall. Many are wildlife reserves and currently provide a recreational resource for coastal visitors.

Lakes and ponds refer to inland bodies of fresh water, included in HSC where they have a distinct maritime character. 'Lakes' generally refer to the larger examples, and 'ponds' to the smaller, but there is a gradation between the two. Similarly with the extent to which they are artificial: most ponds and lakes have become artificially defined to some extent even if their origins lie in relict glacial meltwater lakes, while some ponds are wholly artificial. Cultural aspects are many and varied. Ponds, for example, are used for a breadth of recreational and inspirational activities by anglers and artists, while many larger lakes also support a range of watersports.

Reservoir refers to a body of water, wholly or partly artificial and sometimes covered, used to collect and store water for a particular function (http://thesaurus.english-heritage.org.uk). Many larger examples were designed to provide supplies of drinking water and continued to be used as such, while others have become redundant and now serve primarily as wildlife reserves or watersports centres.

Watercourse refers to a channel used for, or formed by, the conveyance of water. Watercourse can be largely natural in formation such as rivers, or artificial such as aqueducts or drainage channels (http://thesaurus.english-heritage.org.uk). Watercourses serve a wide variety of cultural roles including transport of goods and people, water supply, land drainage to enable agricultural intensification, and recreation in the form of angling, kayaking and so on. Watercourses have always had an important place in the perception of the landscape, with river names preserving some of the most archaic of surviving place name elements. By offering channels for communication and obstacles to movement they still frequently form territorial boundaries, a role which dates back as far as we can perceive such boundaries in the landscape. Water was often given a special reverence in early religions which led to the ritual deposition of many individual items and hoards in natural watercourses.

Wetland refers to an area whose soil is saturated with moisture, either permanently or on an intermittent cycle, such as fens, marshes and peat bogs. The dominant vegetation of wetlands varies considerably and the vegetation cover may be broken by areas of open water. The surviving extent and distribution of wetlands has been significantly affected by human activity, particularly through land drainage and reclamation for agricultural use and urban expansion. Past and present economic activity includes wildfowling and the cutting of peat for fuel and garden soil enhancement. Many wetland areas are now managed as wildlife reserves and enjoyed

recreationally. A notable example of this is the Norfolk and Suffolk Broads, now afforded the equivalent status of a National Park.

Lagoon refers to a body of shallow salt, brackish or fresh water, totally or partially enclosed from the sea by a sand bar, spit or reef running across the entrance. In cultural terms, activities on many lagoons and their adjacent enclosing land are now controlled by wildlife and geomorphological conservation designations, themselves a cultural intervention. The enclosing bars of lagoons' may carry routeways, in some cases metalled roads, taking advantage of the direct route across an otherwise indented coastline e.g. Slapton Sands, Devon. Lagoons are often visited by people for leisure, recreation and inspiration, sometimes with associated facilities to serve them. Lagoons have also on occasion served as areas for military training.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Frequent components of this Character Type include:

- military defences (e.g. pillboxes, anti-tank cubes, signal stations, fortifications, radar stations)
- maritime safety services (e.g. coastguard lookouts)
- navigation aids (e.g. lighthouses, fog stations, landmarks)
- specifically associated infrastructure and features related to industry (e.g. quarries, mines, lime kilns, railway tunnels)
- specifically associated infrastructure and features related to recreation (e.g. nature reserves, walk trails)
- specifically associated infrastructure related to fishing
- settlements

Prehistoric remains in the form of peat deposits can be found embedded within cliff areas. The early Lower Palaeolithic sites on the East Anglian coast (specifically at Happisburgh and Pakefield) are some examples. These sites lie within sediment units exposed on beaches and the bases of cliff sections. Recent marine geophysical and geoarchaeological work has demonstrated that some sediment units be traced offshore, specifically, off Pakefield (Murphy 2007; Wessex Archaeology 2008). From at least the 16th century onwards, cliff tops with strategic sea views have been important for military, coastguards and fishing purposes. Military sites found on cliff tops include look-outs, pill-boxes, batteries, radar stations, castles and forts. Coastguard look-outs and lighthouses can also be found.

Dunes of wind-blown sand and shell deposits occur along low-lying stretches of shoreline. Some dune systems along the English coast are designated to promote their conservation from various perspectives. For example, Winterton Dunes is an extensive dune system on the east coast of Norfolk, which has been designated as a National Nature Reserve and is within the Norfolk Coast Area of Outstanding Natural Beauty (AONB). Winterton has suffered from extensive coastal erosion and is threatened by sea level rise. In general, dunes are post-glacial creations. They are dynamic features and their development is due to the succession of periods of sand movements and stabilizations. For example, a stabilised land surface may be used for pasture, cultivation and settlement before being affected by further sand blow. Later on, this sand surface may become stabilised and re-used again for pasture, cultivation and settlement. Inundations of blown sand may be rapid and may occur as a result of a single storm, given the conjunction of the right conditions. It has been recorded that depths of 2-3m of sand have covered agricultural land in a single event at Gwithian, Cornwall in historic times (Nowakowski *et al* 2007, 58). Prehistoric and historic remains can be buried within dune systems. Consequently, the time-depth within dune systems should not be overlooked.

Lakes can be formed by a number of natural processes. Tectonic uplift and subsequent erosion of a mountain range can create bowl-shaped depressions that accumulate water and form lakes. The advance and retreat of glaciers can gouge troughs and depressions in the surface where water accumulates. For example, the Lake District features (North West England) result from successive periods of glaciation. These features include the ice-carved wide U-shaped valleys, many of which are now filled with the lakes that give the park its name, impounded by areas of glacial moraine.

Lagoons can be formed through both natural and man made processes as demonstrated by the series of features on the Suffolk coast. Three large lagoons between Benacre and Easton Bavents were formed by the dynamic processes of the coastline whilst a fourth was formed through gravel extraction during the Second World War. Further lagoons on Orfordness were the result of clay extraction. The Fleet (behind Chesil Beach, Dorset) and Slapton Leigh, Devon, are good examples of naturally created lagoons annexed from the sea, though not always completely, by bars of gravel deposited in the post glacial period.

Reservoirs generally refer to an artificial lake which is used to store water for different uses. Reservoirs are often created by building a sturdy dam. Once the dam is completed, the stream fills the reservoir. When a reservoir is predominantly human-made (rather than being an adaptation of a natural basin) it may be called a cistern. In England, Thames Water has many underground reservoirs beneath London built in the 1800s by the Victorians, most of which are lined with thick layers of brick.

Watercourses have been utilised since prehistoric times in England and settlement patterns have been found close to freshwater sources. Recent evidence from dried up channels of major rivers like the Thames suggests that rivers and lakes may have been used as funeral areas in the later Bronze Age and Iron Age. In East Anglia the extensive watercourses and wetlands known as the Broads were partially formed by the process of peat extraction. This began locally in the 12th century to provide fuel and was undertaken on such a scale that large pits were formed and subsequently flooded, forming the landscape we see today.

Natural rivers and lakes were used as critical water-supply resources as well as waterways for the transportation of people and goods. Most of these have been later modified to consolidate and stabilise their channels or to make navigation more reliable by the construction of artificial channels and flash locks. The expression of many rivers in the present land and seascape is also modified by the considerable geomorphological changes wrought to most river valley floors by deep deposits brought down from millennia of agriculture and, in some areas, by debris resulting from extensive extractive industries along the river catchments.

VALUES AND PERCEPTIONS

In England, some cliffs have a territorial iconic value. For example, those that face towards Continental Europe, such as the White Cliffs of Dover, forming an outwardly visible national symbol of the country's stand against the threat of invasion during World War Two.

Dune systems is often valued highly for their sense of remoteness and their unmanaged feel, aspects of character altered when in proximity to housing and where dunes have become subject to golf course developments. Public perception often overlooks that the history of the dune systems is often linked to the marine environment and forms a local economic resource in several respects.

The sense of spiritual fulfilment which lakes often engender has a very long history in the perception of our cultural landscape, together with a special reverence for water evident in early religions. Many ritually deposited items and hoards have been found in present and former lake beds.

Ponds are often individually named as distinctive familiar features in the landscape; many are used for a breadth of recreational and inspirational activities by anglers,

artists, those visiting to enjoy the views and to picnic, with many larger lakes supporting a range of watersports.

Watercourses and water bodies in general have been a critical resource for survival, supplying necessary water for communities. They have, and remain, frequently used culturally to define territorial boundaries, or conversely to defined territorial heartlands: foci for settlement and a sense of community. They are also a source of enjoyment through many recreational activities such as swimming, waterskiing, boating, surfing, and diving. Lakesides, beaches and waterparks are also popular places for relaxing and inspiration, which may be expressed through art. Many people find the sound of flowing water to be calming. Some keep fish and other water creatures in aquariums or ponds for show, fun, and companionship. Water fountains have also been created for public or private decorations.

From industrial and transport perspectives, rivers and estuaries have long been important routeways, used over the millennia as crucial transport systems conveying people and goods. In some cases watercourses have been essential to the economic development of whole regions, as for instance, the Orwell in Suffolk was and still is extensively used to transport goods to and from Ipswich, a riverine route established as early as the Anglo-Saxon period.

Wetlands have been used as a cultural resource for their products for millennia. They have for example been used to source reeds, rushes and sedge for use in thatching, animal feed, etc, and for hunting activities such as wildfowl trapping.

Cultural perceptions have also often seen wetlands as areas at the margins of territories, a position ripe for endowment with spiritual significance, enhanced by a special reverence for water evident in early religions. Many ritually deposited items and hoards, and human bodies, have been found in wetlands. In the present day, the marginal place of wetlands is reflected in their frequency as the setting for novels and literature designed to invoke fear.

This Character Type generally provides rich wildlife habitats which, in turn, attract a large number of recreational wildlife watchers. Extensive natural environment designations also illustrate the high environmental values which people apply to this Character Type.

RESEARCH, AMENITY AND EDUCATION

The geological history of cliffs has been extensively researched. However, a broader perspective is needed from a point of view which integrates the different aspects of human activities on the landscape/seascape. This may be particularly appropriate in areas such as East Anglia where evidence of early hominid activity has recently been found in eroding cliff deposits at Pakefield and Happisburgh.

In terms of amenity and educational purposes, cliffs are frequently visited by walkers and climbers, amongst others. Therefore, there is potential to enhance the understanding, appreciation and enjoyment of the heritage encountered by these people on the cliffs.

Dunes can often contain well preserved and stratified buried prehistoric and historical remains. The study of the formation of dunes and their link to the marine environment and climate history could provide an important contribution to the understanding of past human activities. Further research on the geomorphology of sand dunes would enhance this capability. Due to the dynamic nature of dune systems, regular monitoring surveys, particularly after major storm events, are appropriate to identify material remains. In areas with acidic igneous and metamorphic geologies, such as Cornwall, areas containing wind-blown sand may be the only locations where bone is widely preserved in historic and prehistoric contexts, so providing an opportunity for the study of past populations that cannot be conducted outside such coastal areas.

Recreation has used dunes mainly as adjuncts to desirable beaches or as bunker-filled golf courses. However, there is potential for encouraging the appreciation of the dunes themselves, their flora and their historic dimension via online resources and carefully-sited in situ information provision, operating in conjunction with nature conservation needs. On the west Lancashire coast, for example, many of the extensive areas of sand dunes are protected as nature reserves, both for their flora and for the red squirrel populations surviving in the coniferous woodlands planted to protect the dune systems.

The effect of water quality (pollution) on the historic environment may be a factor affecting the preservation of terrestrial, intertidal, and submerged prehistoric and historic features. Pollution alters the chemical composition of water and soil, often making them more acidic and therefore more likely to damage prehistoric and historic features. However, little research has been undertaken on water pollution and its effect on the marine historic environment (Fulford *et al* 1997).

CONDITION AND FORCES FOR CHANGE

Cliffs will continue to experience the gradual erosion by natural forces as well as the culturally induced long-term threat of sea level rise along the English coast. Human forces for change include the construction of sewerage schemes and coastal defences, amongst others. The effects of these construction processes as well as the movement of water and sediments could damage the potential historical and archaeological remains in this Character Type.

Fixed dunes and dune heath are regarded as priorities for conservation under the European Community (EC) Habitats Directive (http://jncc.defra.gov.uk/page-5705). The Sand Dune Survey of Great Britain (1993-1995) gives the total area of sand dunes as 11,897ha in England. Major dune systems are widely distributed, being found around the English coast (except the English Channel (other than Sandwich Bay) and the Thames Estuary). Dune systems are complex and dynamic entities prone to instability and sudden large-scale shifts. This can have significant impacts on the surrounding environment as well as important consequences for recognising, dating, and conserving archaeological remains within these areas. The main threat to dunes appears to be from the expansion of recreation facilities as well as erosion processes and sea level rise. This dynamic and complex environment will naturally change and develop through time. Both natural and cultural processes will directly impact upon this Sub-type and its surroundings such that dune environments will be unlikely to continue evolving as they have done in the past.

Clean water supply is critical for inland areas but there are also concerns along coastal areas about the discharge of water and sewage into the sea, and maintenance of water quality. The effect of water quality (pollution) on the historic environment may also be a factor affecting the preservation of terrestrial, inter-tidal, and submerged prehistoric and historic features.

RARITY AND VULNERABILITY

As already noted, this Character Type is under pressure from a broad range of human activities and their interaction with natural processes which will combine to affect their roles in contributing to our seascape perceptions.

In terms of rarity, along the English coast some cliffs, lagoons and wetlands fall within Sites of Specific Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites (which are wetlands of international importance designated under the Ramsar Convention), and in some occasions they are designated as a Heritage Coast. As an example, Tintagel Cliffs (Cornwall) are a SSSI (http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/sssi/default.aspx) and the area of Tintagel is also possesses a wealth of cultural roles, both in terms of its material heritage with nearby Tintagel Castle and many associated features, and for its less tangible popular reverence for many centuries on account of its parts in the legends surrounding King Arthur and the Knights of the Round Table.

Today, a large proportion of the sand dune resource in England is valued and considered rare enough to be designated as SSSI, SAC, SPA, and/or National Nature Reserve (NNR). For example, Winterton Dunes, an extensive dune system on the east coast of Norfolk which has been designated as a National Nature Reserve and is within the Norfolk Coast Area of Outstanding Natural Beauty (AONB). Dunes are generally rich in buried prehistoric and historical archaeological deposits. These are usually particularly well-preserved since dunes offer a non-acidic environment. Industrial and early recreation sites, such as golf courses, may also survive well within this environment. Dunes are relatively rare formations, and the prehistoric and historic features found within them and other associated remains could also be rare. The geological, ecological and cultural values embodied by dunes and the other expressions of this Character Type overlap and inter-relate: all are relevant when considering initiatives for change and development which affect them. A consideration particularly affecting lakes, ponds, reservoirs, watercourses, wetlands and lagoons is their vulnerability to activities and events far upstream, and the downflow of concentrate materials such as pollutants and sediments.

PUBLISHED SOURCES

Fulford, M, Champion, T, Long, A, eds, 1997. England's Coastal Heritage: A Survey for English Heritage and the RCHME. *RCHME/EH Archaeological Report* **15**, London: EH/RCHME

Murphy, P, 2007. The Submerged Prehistoric Landscapes of the Southern North Sea: Work in Progress, *Landscapes* **I***, 1-22*

Nowakowski, J A, Quinnell, H, Sturgess, J, Thomas, C, and Thorpe, C, 2007. Return to Gwithian: shifting the sands of time, *Cornish Archaeology* **46***, 13-76*

Wessex Archaeology 2008b, *Seabed Prehistory: Gauging the Effects of Marine Aggregate Dredging. Volume VII: Happisburgh and Pakefield Exposures*, Salisbury: Wessex Archaeology/English Heritage

WEBSITES

http://www.durhamheritagecoast.org/

http://www.turning-the-tide.org.uk/

http://www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0017072

http://www.jncc.gov.uk/page-161

http://jncc.defra.gov.uk/page-5705

http://www.naturalengland.org.uk/

http://www.nebiodiversity.org.uk/biodiversity/habitats/coastalmarine/sanddunes

1.1.10.3 Character Type: Cultural Topography (Inter-tidal)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type includes the following Sub-types:

- Saltmarsh
- Sandy foreshore
- Shingle foreshore
- Rocky foreshore
- Sandflats
- Mudflats

This Character Type refers to those aspects of cultural topography whose physical expressions are predominantly in the intertidal zone, including along estuaries. For HSC, the inter-tidal zone is perceptual at least as much as a matter of technical definition: the relationship between the actual extent of the perceived 'inter-tidal' zone and the levels of Mean High Water and Mean Low Water will vary from place to place due to many factors.

Saltmarshes are areas in the upper inter-tidal zone whose vegetation cover is dominated by salt-tolerant herbaceous plants. The tide is the dominating characteristic of a salt marsh, the cyclical inundation by salt water defining the plants and animals that can survive in these areas. The extent and distribution of saltmarsh has been strongly affected by human activity, especially land reclamation for agricultural use and urban expansion, and by the impacts of pollution. A particular issue is 'coastal squeeze', where lines of fixed sea defences prevent the inland expansion of saltmarsh in the face of rising sea levels and losses to erosion. Now seen as a valuable buffer mitigating the coastal impacts of rising sea levels and increased storminess, some areas of saltmarsh are being deliberately allowed to expand by breaching former sea defences. Economic uses of saltmarshes have included seasonal grazing and wildfowling. In some areas they supported a prolific salt-making industry, boiling off the brine to leave sea salt and leaving tangible remains include 'red hills': mounds of burnt debris and briquetage. Past and ongoing human activity has also affected the creation of deposits supporting saltmarsh in at least some areas: millennia of material washed downslope from agricultural soil disturbance and extractive industries on land have had profound geomorphological effects on many of our river valleys and contributed to the quantity and chemical composition of the silts deposited in estuaries. Large areas of saltmarsh have historically been reclaimed for agricultural use.

The foreshore is broadly equated in HSC with land sloping down through the intertidal zone from the landward coastal margin; the extent of the foreshore is defined by the perception of intertidal levels. The English foreshore remains a well-used and well-visited resource. It also contains a rich and diverse legacy of prehistoric and historic remains which are vital to enable a deeper understanding of the long-term relationship with the sea and of those maritime influences which have contributed to the forging of England as a major mercantile, industrial and imperial nation.

A foreshore surface may be covered by exposed sediments of various grain sizes, by loose rock or bedrock, or it may have a vegetation cover as in a 'Saltmarsh'. In a 'Sandy foreshore', the predominant cover is exposed fine rock sediments of a grain size generally perceived as 'sand'. It is the perception that matters more than the technical definitions of sand by particle size (e.g. http://www.bgs.ac.uk/planning4minerals/Resources_3.htm). Human activity has had a considerable effect on the current distribution of sandy foreshores, with deliberate retention of sand in some areas by the use of groynes, and corresponding depletions elsewhere by beach replenishment works and by quarrying of beach sand for the construction industry to name a few. Many sandy foreshores are now visited for leisure and they form one of the principle areas by which most people engage directly with the intertidal and marine zones. Other cultural activity now or previously affecting this Type includes shellfish and bait gathering, and impromptu areas for landing and loading cargo. As easy landing places, many sandy foreshores form the focus for military coastal defence systems. Their shelving profile also makes them high risk zones at times of extreme high spring tides and storm surges, therefore many are backed by coastal sea defences. The distribution of sand on foreshores varies on long and short cycles, giving potential in some areas for the occasional exposure of buried ancient land surfaces, occupation layers and structures, and associated palaeoenvironmental deposits.

A 'shingle foreshore' has a predominant surface cover of exposed rock sediments of a grain size generally perceived as 'shingle' or 'pebbles'. Human interventions affecting the current distributions of shingle foreshores include the deliberate retention of shingle

in some areas by the use of groynes, and corresponding depletions elsewhere by quarrying of shingle for beach replenishment works, and the landscaping and construction industry, Many shingle foreshores are now visited for leisure Some shingle foreshores form banks or spits, creating sheltered marine areas which become the focus for leisure activities. Many have the potential for attracting marine and bird life, and are the focus of wildlife watching. Shingle foreshores are often aligned in ridges of differing ages, the oldest generally located furthest from the present shoreline, giving valuable time depth. Shingle foreshores can also often extend to form 'spits' of land, slightly detached from the shore such as Orfordness in Suffolk.

Rocky foreshore refers to the predominant surface of exposed bedrock outcrops and associated boulders and large pebbles. Rocky foreshores are the focus for a range of cultural activities, as they have been in previous centuries. Many form easily accessible geological exposures for quarrying and mining and, from a recreational aspect, for the collection of geological and fossil specimens. Seaweed harvesting for agricultural fertiliser and, in some areas, for soda-ash manufacture, was once widespread, and various shellfish species were gathered for food and bait. Many rocky foreshores, especially in bays along rocky coastlines, contained areas cleared as small landing places, often with rough quays built from the cleared rocks. Some coastal quarrying areas were provided with trackways cut into the foreshore bedrock to facilitate loading onto beached vessels. Recreational use of rocky foreshores also includes coastal angling and rock-pooling.

Sandflats are relatively mobile, thick sand deposits, submerged at high tide and exposed at low tide, and often expressed as areas of sandbanks detached from the shore by tidal channels. Their form results from the complex interaction between hydrodynamic and sediment transport processes. Where sediment deposition results in deposition of finer particle sizes - clays and silts – the outcome is 'Mudflats', which can also be differentiated from sandflats in the ecological communities they support and, for HSC, their cultural implications. The processes giving rise to sandflats vary in their outcomes through time, producing shifting positions and sizes of sandbanks within an overall area of sandflats. Sandflats are common features of estuaries and shallow bays but can also occur on the open coast where prevailing currents and marine topography regularly produce appropriate depositional conditions. Common cultural activities on sandflats include shellfish harvesting for food and bait while some support areas of shellfish farming. Activities on many areas of sandflats are now controlled by various wildlife conservation designations, themselves a cultural intervention. More obviously destructive intervention derives from the impact on sandflats of dredging navigation channels to coastal ports. Pollution from coastal industries and nitrogen run-off are also identified as affecting sandflat ecology.

Mudflats are relatively mobile, thick deposits of clays, silts, organic detritus and some very fine sand content, submerged at high tide and exposed at low tide, and often expressed as areas of muddy banks in sheltered areas along estuary sides, to seaward of saltmarsh and along the fringes of sandflats. The processes giving rise to mudflats vary in their outcomes through time although the conditions producing mudflats lead to greater stability in their position and extent than is the case with sandbanks in sandflats. Culturally, in many estuaries, past and ongoing human activity has contributed to the deposits now evident as mudflats: millennia of material washed downslope from agricultural soil disturbance and extractive industries on land have had profound geomorphological effects on river valleys and contributed to the amounts and chemical composition of the silts deposited in our estuaries. In some areas, for instance the rias of Cornwall, past mining activity has introduced so much extra silt that tidal limits have retreated seawards, often for considerable distances, leaving former ports (e.g. Tregony on the Fal) cut off from the sea. Mudflats also contribute hazards to estuarine shipping. Common cultural activities on mudflats include shellfish harvesting for food and bait while some support areas of shellfish farming. Activities on many areas of mudflats are now controlled by various wildlife conservation designations, themselves a cultural intervention. More obviously destructive intervention derives from

the impact on mudflats of dredging navigation channels to coastal ports, while the bow-wave wash from passing shipping has been invoked as a cause of mudflat erosion on some cases. Pollution from coastal industries and nitrogen run-off are also identified as affecting mudflat ecology.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

This Character Type contains abundant traces of past and present maritime human activities. Palaeolandscape components, often in the form of peat deposits, can also be found within this Character Type. The Lower Palaeolithic sites on the East Anglian coast (specifically at Happisburgh and Pakefield) are some examples. These sites lie within sediment units exposed on beaches and the bases of cliff sections. Recent marine geophysical and geoarchaeological work has demonstrated that some sediment units have been traced offshore, specifically off Pakefield (Murphy 2007; Wessex Archaeology 2008). Intertidal peat deposits in the Isles of Scilly, formed in a saltmarsh environment, have been dated to the Middle Bronze Age and Late Iron Age while subtidal deposits from a freshwater, wooded environment have been dated to the Late Mesolithic (Charman *et al* forthcoming). Buried prehistoric land surfaces are inherently fragile and can contain unique palaeoenvironmental evidence (as well as artefacts and ecofacts) that can be enormously informative about past human activities. Furthermore, palaeoenvironmental evidence can relate those activities to an area's vegetational history or to the processes of submergence and coastal or estuarine change. These are examples illustrating the time-depth that this Character Type contains in some areas of England.

Intertidal areas often formed convenient routes of travel for people and/or animals and early evidence for this has been found in several intertidal contexts. For example, the Neolithic trackways on the Isle of Wight at Wootton Quarr (Waller 2006); a Hightown Neolithic trackway near the mouth of the Mersey River with radiocarbon dating of 3960-3690BC (Gonzalez and Cowell 2007); the Post Track and Sweet Track in Somerset, dated, dendrochronologically, to 3838 BC and 3807/3806 BC respectively (Pollard and Healy (eds) 2008, 75); and the Formby prehistoric footprints (Merseyside) (Huddart *et al* 1999).

Most features within this Character Type are by-products of the use of the coasts and estuaries for fishing, shipping and industry, such as quays, piers or fish-traps, commonly now abandoned and visible only as low footings of walls or lines of decaying or fragile timbers or stakes. Wrecks or hulks of ships and boats can survive on sandy foreshores and rocky headlands but, in the latter, they will mainly be fragmented. The wreck of the Amsterdam sunk in 1749, for example, is located on the foreshore near Hastings. At low tide, remains of the hull are exposed with local people walking around the area almost oblivious to its presence.

VALUES AND PERCEPTIONS

In England, this Character Type remains highly valued as a place for inspiration and recreational activities including a variety of beach and watersports, fishing and sunbathing. The liminality and bleak, often hazardous nature of this character type has led to its use as a backdrop for literary works such as M R James' ghost stories, many of which were set on the isolated Suffolk coast. The bio-diversity of these areas also makes them popular places for botanical rambles and wildlife watching.

Culturally, some of these inter-tidal areas, such as sandflats, have long been perceived as severe hazards to coastal and estuarine shipping from their mobility and the resulting difficulties in maintaining accurate charts. But even if their expression may be dynamic, many areas of sandflats have a distinct presence through time and are specifically named. Their notoriety to ship's pilots may be matched by dangers of stranding, or as quicksands for walkers using sandflats at low tide to short-cut otherwise long coastal journeys.

Intertidal studies have been viewed as extremely valuable from a maritime archaeological perspective due to their often rich survivals of organic material and closely-associated palaeoenvironmental evidence (Fulford *et al* 1997; Flemming 2002).

RESEARCH, AMENITY AND EDUCATION

This Character Type is relatively poorly researched; a deeper and more comprehensive understanding of the historic character it encompasses is needed to inform Shoreline Management Planning. Ongoing programmes of work such as the Rapid Coastal Zone Assessment Surveys (RCZAS) and the National Mapping Programme (NMP) are already contributing to this, establishing a wealth of knowledge about the extant cultural survivals in our coastal zone.

A more comprehensive understanding of the intertidal zone will also allow the development of fit-for-purpose management strategies as well as their implementation through integrated management plans The provisions for an English coastal access route, contained in the Marine and Coastal Access Act 2009, offer an excellent opportunity to combine this with raising public awareness and understanding of the many differing cultural perceptions that bear on the coast.

CONDITION AND FORCES FOR CHANGE

This Character Type will continue experiencing the gradual erosion by coastal processes, enhanced by the long-term implications of sea level rise and increased wave height and storm events along the English coast. Cultural forces for change include the construction of new sewerage schemes and coastal defences, harbour dredging, and many others. The material effects of these processes as well as the movement of water and sediments often occur far from the actual site of the cultural activity itself. The potential existence of buried archaeological features within the foreshore is also a consideration when dealing with coastal developments. Human activities such as salvage, the random recovery of archaeological 'souvenirs' and some fishing activities could be extremely damaging to the non-renewable and fragile nature of prehistoric and historic remains.

Unwanted effects from cultural activities, such as oil and other toxic pollution, also affect intertidal ecosystems, often to their severe detriment: these too may be affected by events far upstream, which may concentrate pollutants and toxic sediments. Contaminants can be introduced which do not disintegrate rapidly in the marine environment, such as plastics, pesticides, furans, dioxins, and heavy metals.

The Marine and Coastal Access Act 2009 makes provision to improve access, creating a right to walk around England's coast; to address uncertainty arising from lack of consistency, security and clarity in rights of public access to foreshore, beaches and coastal land (HM Government 2009). This will contribute clarify, simplify and extend access through the creation of a coastal access corridor to which the public has right of access on foot for outdoor recreation. It is also stated that access will be made resilient to coastal change. As noted above, the information resource created for this route offers an excellent opportunity for raising public awareness and understanding of the marine, intertidal and landward perspectives that combine uniquely along the coast.

RARITY AND VULNERABILITY

Relatively little-disturbed intertidal areas are relatively rare, fragile and valuable maritime archaeological resources with often rich survivals of organic material and closely-associated palaeoenvironmental evidence. They are also perceived as offering rare opportunities for peace, solitude and inspiration with little obvious intrusion from other people either materially or intangibly through noise for example. Where located close to existing centres of population and commerce, their lack of development both

enhances those perceived cultural qualities and their vulnerability as prime areas for residential and commercial expansion.

These areas also represent typically important zones for wildlife. They are often of particular importance to migratory birds. For example, in England mudflats have been classified as a Biodiversity Action Plan priority habitat. A Biodiversity Action Plan (BAP) is an internationally recognized program addressing threatened species and habitats and is designed to protect and restore biological systems. Their cultural value may also be recognised by the creation of a Historic Environment Action Plan (HEAP) to work in conjunction with the BAP, as for example on the Isle of Wight (http://www.iwight.com/Residents/Libraries-Cultural-and-Heritage/Heritage-Service/Archaeology/Historic-Landscapes-on-the-Isle-of-Wight).

Along the English coasts some intertidal areas fall within Sites of Specific Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites (which are wetlands of international importance designated under the Ramsar Convention), and in some occasions they are designated as a Heritage Coast.

PUBLISHED SOURCES

Charman, D, Johns, C, Camidge, K, Marshall, P, Mills, S, Mulville, J, and Roberts, H M, forthcoming. *The Lyonesse Project: a study of the evolution of the coastal and marine environment of the Isles of Scilly*, Truro: Cornwall Council and English Heritage

Flemming, N C, 2002, *The scope of Strategic Environmental Assessment of North Sea areas SEA3 and SEA2 in regard to prehistoric archaeological remains*. Department of Trade and Industry

Fulford, M, Champion, T, Long, A, eds, 1997. England's Coastal Heritage: A Survey for English Heritage and the RCHME. *RCHME/EH Archaeological Report* **15**, London: EH/RCHME

Gonzalez, S, Cowell, R, 2007. Neolithic Coastal Archaeology and Environment around Liverpool Bay in J, Sidell, and F, Haughley, eds, *Neolithic Archaeology in the Intertidal Zone*, Oxford: Oxbow Books

HM Government. 2009. *Marine and Coastal Access Act 2009*. London: HM Stationary Office Ltd

Huddart, D, Roberts, G, Gonzalez, S. 1999. *Holocene Human and Animal Footprints and Their Relationship with Coastal Environmental Change, Formby Point, NW England*. *Quaternary International* **55**, 29-41

Murphy, P, 2007. The Submerged Prehistoric Landscapes of the Southern North Sea: Work in Progress. *Landscapes* **I**, 1-22

Pollard, J, and Healy, F, eds, 2008. Neolithic and Early Bronze Age in C J, Webster, ed, 2008, *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council, 75-102

Waller, R, 2006. *Neolithic to Early Bronze Age Resource Assessment: Isle of Wight. For the Solent Thames Regional Research Framework* (http://www.buckscc.gov.uk/bcc/archaeology/solent_framework.page)

Wessex Archaeology, 2008. *Seabed Prehistory: Gauging the Effects of Marine Aggregate Dredging. Volume VII: Happisburgh and Pakefield Exposures*, Salisbury: Wessex Archaeology/English Heritage

WEBSITES

https://www.gov.uk/government/topics/environment

http://www.ambaile.org.uk/

http://www.ukmarinesac.org.uk/activities/bait-collection/bc11.htm

http://www.jncc.gov.uk/

1.1.10.4 Character Type: Cultural Topography (Marine)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type includes the following Sub-types:

- Coarse sediment plains
- Fine sediment plains
- Mud plains
- Mixed sediment plains
- Sand banks with sand waves
- Exposed Bedrock

This Character Type refers to those aspects of cultural topography whose physical expressions are predominantly seaward of Mean Low Water.

Coarse sediment plains are extensive areas of seafloor whose surface sediments predominantly comprise different grades of pebbles, rocks, boulders etc with lower sand and very low silt and clay contents. Of cultural relevance is their role as a spawning ground and habitat for particular commercially-exploited fish species and hence their correlation with particular fisheries and their management considerations by government, conservation bodies and fishing communities. Bottom trawling methods also have significant impacts on marine habitats and biodiversity in this Sub-character Type. Coarse sediment plains also provide distinct preservation conditions for their share of the occasional seafloor wrecks present across all the seas. Their relationship to marine topography has implications for the potential form and survival of underlying palaeolandscape components. They will also incorporate some of the 'background noise' of pollution, especially by littered debris, which now affects all marine areas from sea surface to sea floor.

Fine sediment plains refer to large areas of seafloor whose surface sediments predominantly comprise different grades of sand and very low silt and clay content. Of cultural relevance is their role as a spawning ground and habitat for particular commercially-exploited fish species including flatfish and hence their correlation with particular fisheries and their management considerations by government, conservation bodies and fishing communities. Bottom trawling methods also have significant impacts on marine habitats and biodiversity in this Sub-character Type. Fine sediment plains also provide distinct preservation conditions for the occasional seafloor wrecks present across all the seas. Their relationship to marine topography has implications for the potential form and survival of underlying palaeolandscape components. They too will also incorporate some of the 'background noise' of pollution which now affects all marine areas and tiers.

Mud plains refer to extensive areas of seafloor whose surface sediments predominantly comprise fine sediment grades with high silt and clay contents. Occurring mainly in sheltered seas around England, they have cultural relevance as the chief habitat for a range of commercially-exploited shellfish species, including *nephrops spp*. (Langoustines/Dublin Bay prawn), and hence their correlation with particular fisheries and their management considerations by government, conservation bodies and fishing communities. Trawling methods also have significant impacts on marine habitats and biodiversity in this Sub-character Type. Mud plains provide distinct preservation conditions for the occasional seafloor wrecks present across all the seas. Their relationship to marine topography has implications for the potential form and survival

of underlying palaeolandscape components. They will also incorporate their share of the 'background noise' of pollution.

Mixed sediment plains are extensive areas of seafloor whose surface sediments predominantly comprise heterogeneous sediment grades, from pebbles and gravels to sands, silts and clays. The overall composition can be highly variable, as can the form of their grades' mixing. In addition to well-mixed sediments, they may include component mosaics and/or layering. Their highly variable composition and form distinguishes this Sub-character Type from the coarse and fine sediment plains and their more definable cultural implications for fish habitat, shipwreck preservation and palaeolandscape form, however bottom trawling methods still have significant impacts on marine habitats and biodiversity in this Sub-character Type. These areas also incorporate their share of the 'background noise' of pollution.

Sand banks with sand waves refer to an area of sand banks containing extensive wavelike structures and megaripples formed by rapidly moving currents of water on the sandbanks' surface. These may occur around the margins of sandflats and be barely submerged at various states of the tide or they may occur in deeper water. They can pose hazards to shipping and many in shallower waters appear on charts. They form a spawning ground and habitat for various commercially-exploited fish species including flatfish and shellfish, hence their correlation with particular fisheries and fishery management considerations by government, conservation bodies and fishing communities. Shellfish harvesting, dredging and bottom trawling methods have significant impacts on marine habitats and biodiversity in this Sub-character Type. Sand banks with sand waves also provide distinct preservation conditions for wrecks present within them. Their relationship to marine topography has implications for the potential form and survival of underlying palaeolandscape components. They will also incorporate their areas' share of the 'background noise' of pollution.

Exposed bedrock refers to areas of the seafloor whose surface predominantly comprises bedrock exposures along with associated rocks and boulders but little finer sediment deposition. Variation in depth and surface irregularity of the bedrock exposures will correspond with the dangers they pose to shipping. Bedrock exposures are liable to snag fishing gear and may figure as 'rough' or 'catchy' areas in fishing ground perceptions. Their potential hazard to shipping may increase wreck debris to be found in this Sub-character Type, while it will also contain its share of the 'background noise' of pollution.

This Character Type varies considerably in the UK Continental Shelf, its variability being linked to the survival of prehistoric and historic features within it. Understanding this Character Type will enable an assessment of its archaeological as well as its historic character. For example Lizard Point (Southern England) is a headland highly exposed to sea conditions. It is characterised by a rocky foreshore with a rapidly dropping bathymetry, creating overfalls off the tip of the Lizard. Hence, Lizard Point is considered as having a high potential for ship losses based on the combination of rocky foreshore, potentially dangerous sea conditions, and overfalls. The seabed around the headland is bedrock, producing a very low potential for preservation of archaeological material due to its rocky nature. This would encourage scattered preservation within gullies rather than the presence of large segments of wreck material (for further details see Merritt *et al* 2007). Another example is Hurst Spit, a gravel spit running into the Western Solent. The area is exposed to prevailing winds and the seabed is characterised by gravels. The archaeological potential for the western side of the spit is low due to a high density of gravel. However, the eastern side is characterised by fine grained estuarine silts running out from the Lymington River and is therefore characterised by a high potential for good archaeological preservation. The only stratified Mesolithic site in a submerged location in England (Bouldnor Cliff) has been discovered in this area (Momber 2004).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The cultural aspects of this Character Type are several. The effects of human activities on marine biodiversity have been present for millennia since man began serious exploitation of marine resources, but their scale and intensity increased enormously during and since the later 19th century. So too has the character of their impact on sea floor deposits and wildlife as fishing methods have developed to feed the rapidly growing populations of England and its neighbours, with rapid inland transport and refrigeration allowing fish to move from being a coastally-consumed product to one serving the inland population too. The resulting intensification of marine fish resource exploitation has far outstripped the carrying capacity of many fish species whether sought or caught unintentionally as 'by-catch'.

Many offshore marine areas are also areas that were once dry land at times of low sea level during the glacial periods and within several millennia of them, when much water was locked up in the ice sheets. That now submerged land was then human habitat whose land forms, buried soils and direct material remains, in the form of flint or bone tools and prey species' bones, are increasingly being recognised and researched from present activities affecting this Character Type.

Later activity above, on and in the sea has also produced a scatter of wreck and air-crash debris, along with considerable quantities of litter, affecting all expressions of this Type, however 'natural' they may otherwise appear.

Prehistoric and historic deposits exist widely across the UK Continental Shelf. Understanding the characteristics of the geological deposits (age and origin) including the geological processes that have formed the sediment deposits can provide insights into the potential type and location of its associated cultural features. Understanding the geological characteristics of the deposit therefore provides the essential foundation for the evaluation of archaeological or palaeoenvironmental potential. Depending on the mode and age of formation, for example, sand and gravel deposits may seal, contain and/or underlie single or multiple-episode archaeological deposits. Soft aggregates are mostly derived from the Middle and Late Pleistocene, which is contemporary with the first human colonisation and subsequent occupation of England and North-west Europe until the end of Last Ice Age (i.e. Palaeolithic period) (see Wenban-Smith 2002). Pleistocene fluvial, glacial and periglacial and beach gravels form much of the Palaeolithic archaeological record. Furthermore, Late Devensian and Holocene gravels provide much of the buried archaeology of valley landscapes (Brown 2004). Processes such as climate change and the fluctuation of sea levels over the last 2 million years contributed to the deposition of sand and gravels which now lie on the seabed (Gubbay 2005). These materials were originally deposited by rivers systems that are now submerged (BMAPA 2000; ODPM 2005). These processes have periodically exposed seabed as dry land, thereby creating a space for human occupation and the potential for associated archaeological deposits. The archaeological potential of these marine deposits is immense, and there is still a need to enhance our understanding of these drowned landscapes and palaeoenvironments which are still relatively poorly understood.

Areas of mud and silt deposits can generally be found within estuarine contexts such as the entrances to Foulness in the Crouch Estuary and around the entrance to the Swale, stretching out towards Margate. Another case is the Wash estuary, which has a predominantly sandy seabed, with fine grained silts and mud along the foreshore surrounding the river entrances. The approaches are characterised primarily by a gravel seabed although the areas where the banks have formed tend to be sand or gravely sand. The preservation of archaeological remains in these contexts could be considered as high although in gravely contexts remains could be scattered and/or broken. Conversely, the seabed on the approaches to the Severn Estuary, although wide and exposed, is characterised by solid bedrock deposits which are not conducive to burial and *in situ* preservation.

VALUES AND PERCEPTIONS

This Character Type is highly valued ecologically due to its biodiversity. For example, the Wash (Norfolk/Lincolnshire), on the east coast of England, consists of extensive fine sands and drying banks of coarse sand. This diversity of substrates, together with a variety in degree of exposure, means that there is a high diversity relative to other east coast sites

(http://www.jncc.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=h1140).

Lately, this Character Type has received increasing attention from archaeologists recognising the archaeological potential that it could represent and therefore its contribution to the understanding of past communities' dynamic and varied use of the landscape they inhabited.

RESEARCH, AMENITY AND EDUCATION

The English Heritage-Aggregates Levy Sustainability Fund (ALSF) ***Enhancing Our Understanding: Navigational Hazards*** project used the UK's extensive hydrographic archives, including charts, sailing directions and pilotage notes, and modern seabed geology mapping to identify and map 'Areas of Maritime Archaeological Potential' (AMAP): areas where high potential for shipwreck losses coincide with areas of high preservation potential (Merritt *et al* 2007). This project provided the foundations for the development of a quantitative system for assessing the archaeological potential for shipwreck material in the marine environment according to different sediment types. Application to shipwrecks as well as other archaeological deposits such as submerged prehistoric landscapes would enable a deeper understanding of the archaeological potential of the marine environment.

The Submerged Palaeo-Arun River Project funded through English Heritage-ALSF has reconstructed the palaeomorphology of submerged and buried landscapes of palaeo-Arun valley on the northern English Channel, integrating geophysical, geomorphological and sedimentological investigation of offshore river systems (Gupta *et a*l 2004). This research facilitated the development of models which allow complex submerged landforms and buried subsurface variations that have extensive archaeological potential to be better understood. The new data provided by this study has contributed to the emerging field of submerged prehistoric archaeology, as well as developing procedures to assess the potential of the archaeological resource in offshore areas.

Collaborative projects between industry and the heritage sector through the analysis of further geophysical data and sediment characteristics and dynamics will contribute to clarify issues regarding archaeological potential and its preservation in the marine environment.

The amenity value of this Character Type could be further explored through, for example, interactive CDs and web resources. This Character Type also offers potential for educational initiatives to raise public awareness about the connection between both the natural and historic environment within a marine context.

CONDITION AND FORCES FOR CHANGE

The historic cultural character of this Character Type is both added to and under pressure from offshore development activities. Depending on the industrial activities, geophysical surveys (and in some cases core sampling and diver inspections) are a requirement for offshore developments (e.g. wind farms and aggregates extraction, amongst others). These surveys can potentially increase the knowledge about the historic environment of a regional and local area. Furthermore they could enable the construction of detailed palaeoenvironmental and palaeogeographic reconstructions. Models (on local and regional scales) could then be developed for the location of particular types of site, for example. In an ideal world, this information will then feed into the local and national monuments records and inform future curatorial decisions. This will provide the opportunity for beneficial cumulative knowledge regarding the marine zone.

English Heritage-ALSF funding, with cooperation from the British Marine Aggregate Producers Association (BMAPA) has produced *Protocol for Reporting Finds of Archaeological Interest* from aggregates extraction activities by BMAPA companies: the protocol has produced a large number of valuable and varied finds reports since its inception in August 2005 (http://www.wessexarch.co.uk/files/projects/BMAPA-Protocol/protocol_text.pdf).

RARITY AND VULNERABILITY

Some prehistoric and historic features within this Character Type could be considered rare where time-depth is visible (e.g. Bouldnor Cliff submerged landscape, off the Isle of Wight).

This Character Type is under pressure from both natural and culturally induced processes such as erosion, sea level rise and global warning. The ecosystems within this Character Type are also under pressure from human activities such as intrusive fishing activities (e.g. trawling) and offshore developments (e.g. wind farms, and aggregate extraction amongst others). The effects of these activities as well as the movement of water and sediments could damage the prehistoric and historic features present and largely yet to be revealed within this Character Type.

PUBLISHED SOURCES

BMAPA. 2000. *Aggregates from the Sea. Drawing Strength from the Depth*s. London: BMAPA

Brown, A, 2004. *The Achievements, Status and Future of Aggregate Extraction Related Archaeology in England*, Unpublished Report

Gubbay, S, 2005. *A Review of Marine Aggregate Extraction in England and Wales 1970-2005*, Report for The Crown Estate

Gupta, S, Collier, J, Parmer-Felgate, A, Dickinson, J, Bushe, K, Humber, S. 2004. *Submerged Palaeo-Arun River: Reconstruction of Prehistoric Landscapes and Evaluation of Archaeological Resource Potential*. Report Number 3543 & 3277, Imperial College on behalf of English Heritage, London

Merritt, O, Parham, D, McElvogue, D, 2007. *Enhancing our Understanding of the Marine Historic Environment: Navigational Hazards Project Final Report*, Bournemouth: Bournemouth University on behalf of English Heritage

Momber, G, 2004. Drowned and Deserted: A Submerged Prehistoric Landscape in the Solent, England in N, Flemming, ed, Submarine Prehistoric Archaeology of the North Sea: The Inundated landscapes of the Western Solent, York: *CBA Research Report* **141**, 37-42

ODPM. 2005. Marine Mineral Guidance 1: Extraction by Dredging from the English Seabed

Wenban-Smith, F, 2002. *Palaeolithic and Mesolithic Archaeology on the Seabed: Marine Aggregate Dredging and the Historic Environment*, BMAPA, London: English Heritage and Wessex Archaeology

WEBSITES

http://www.jncc.gov.uk/

1.1.11 Broad Character: Woodland

1.1.11.1 Character Type: Woodland

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Woodland includes the following Sub-types:

- Ancient woodland
- Plantations

The 'Woodland' Character Type has relevance for HSC where its character and the activities underlying it have a distinctly maritime flavour or connection. Examples may include woodland established along the edges of tidal rivers, cliffs and former coastal rough ground to minimise erosion. Coastal woodlands, often uniquely named with clearly defined ownership and management rights, were often important in providing timber and other materials for boat building and other coastally-focussed activities. Patterns of woodland also form distinctive elements of the coastal landscape visible from the sea, aiding position-finding from ships.

Ancient woodland is formally defined as land that has had continuous woodland cover since at least 1600 AD (http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm). There are two main varieties (and many further subdivisions of those):

- 'Ancient semi-natural woodland' - ancient woodland sites that have retained the native tree and shrub cover that has not been planted, although it may have been managed by coppicing or felling and allowed to regenerate naturally; and
- 'Ancient replanted woodland' - ancient woodland sites where the original native tree cover has been felled and replaced by planting, usually with conifers and usually during the 20th century.

The Ancient Woodland Inventory is a digital database of ancient woodland but has a number of limitations, for example only ancient woodlands over 2ha in extent on the 1920s base maps are included (see http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm for full discussion).

Plantations are areas deliberately planted, often cyclically-replanted, with trees on new sites as a crop to supply industrial and domestic demands for wood. Very few plantations date prior to 1700 and those from the 18th and 19th centuries were generally of small scale, unintensively managed and of native or exotic deciduous species. The majority of existing plantations result from the creation of the Forestry Commission in 1919 in response to Britain's shortage of timber after the First World War. The establishment of 20th century plantations accelerated after the Second World War, driven by the perceived need for self-sufficiency in timber coupled with rapidly increasing investment in, and mechanisation of forestry processes. These modern plantations commonly contain only one or two species of tree, usually conifers, and often extend over considerable areas, subdivided by access roads and rides into compartments of trees planted at of one time.

Although woodlands in general do not inherently possess a distinctly maritime character, in some circumstances they certainly do and are included in HSC where they extend down to the water's edge in tidal rivers or on the coast where they have been established on the cliffs and former coastal rough ground, often managed to minimise erosion (Tapper and Johns 2008). Woodlands were important places, providing timber and other materials for boat and ship building and a range of other timber, brushwood and fuel resources needed by local coastal communities.

The maritime expressions of woodland comprise mainly the remnants of traditionally managed woodlands, usually found in the steep-sided valleys extending inland from rivers or, in some cases, via tributaries. It incorporates both major varieties of ancient woodland and some plantations. Traditional management techniques include coppicing (harvesting wood by cutting trees back to ground level) and pollarding (harvesting wood at about human head height to prevent new shoots being eaten by grazing species such as deer). Both techniques encourage new growth and regular harvesting for poles and fuel while allowing the sustainable production of timber and other woodland resources.

During the 20th century, the use of these traditional management techniques declined whilst the large-scale mechanised forestry management increased, especially in plantations and areas of ancient woodland replanted with conifers. These changes in management methods resulted in major changes to ancient woodland's character. There was also a wider loss of ancient woodland to agricultural land.

From the later 20th century, conservation initiatives by bodies such as the Woodland Trust and the National Trust have reintroduced traditional woodland management techniques to many of the woodland areas they control, including their coastal estates.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Many of the cultural imprints of coastal woodland are expressed in its management and the form and structure of the woodland vegetation (as a whole, not only the trees). Against that overall cultural background, typical discrete artificial elements may include material traces from that woodland management itself, such as charcoal burners' platforms, but also:

- banks, tracks and paths;
- drainage ditches;
- fences.

Large tracts of the coastal zone would have been under woodland cover as vegetation recovered after the last glaciation, but the effects also of post-glacial sea level rise and coastal salt spray is always likely to have given it a distinct character in species structure and openness from woodland further inland. Clearance from the Neolithic period onwards has considerably reduced coastal woodland cover in many areas. Where they do survive extensively in the present coastal land and sea-scape is often a reflection of woodland that served local needs until relatively recently or areas which have not been deemed profitable or feasible to manage for other purposes, for example on very steep or boulder strewn coastal slopes.

The term ancient semi-natural woodland is applied to those woodland areas which are considered to have been in existence from at least AD 1600. These woodland areas remain to the present day without having been fully cleared for uses other than woodland management or timber production.

The surviving ancient woodlands would have long been managed and have formed important elements of the working landscape for many centuries. Medieval farmers and craftsmen would have exploited them as pasture grounds, sources of fuel, coppice wood and timber.

One of the processes which featured in the creation of new plantations was the planning of large estates in the 18th and 19th centuries. Many were established as game cover in East Anglia, where pheasant shooting became ubiquitous in the 19th century and others were planted to 'beautify' the landscape, including along the coast (Williamson 2005, 109).

VALUES AND PERCEPTIONS

Patterns of coastal woodland provide one of the distinctive landscape components visible from the sea. Those patterns are culturally defined and combine with variation in topography and other cultural features and aspects to give a sense of place and position to mariners and coastal users alike.

Many woodlands have some public access although this is less true of privately-owned plantations. They are often regarded as being highly tranquil places, enhanced along the coast and estuaries by the visual play of the coastline itself, glimpsed intermittently through the trees. In some areas such as North Norfolk the presence of the now-ubiquitous pine forest has become an accepted part of the coastal landscape inexorably linked to the adjacent foreshore. Recreational activities such as walking focus as much on the woods as the beach.

Conifer plantations are often perceived as dark, threatening and relatively sterile in terms both of more traditional historic environment survivals and biodiversity. That is more apparent in perception than reality however. A number of studies have revealed a high level of archaeological survival within conifer plantations: archaeological destruction within such areas needs to be confirmed rather than assumed. Conifer plantations are host (and a refuge) to a range of wildlife including much of the native deer population and several nationally rare species including the nightjar and, in the conifer plantations along the dunes of west Lancashire, the red squirrel (www.countryscape.org/interact/scapemap/).

RESEARCH, AMENITY AND EDUCATION

Woodlands contribute strongly to present coastal seascape character and they have a considerable amenity value. The Woodland Trust hosts a number of events and campaigns to raise awareness of woodlands and provides activities and learning resources on its website (www.woodland-trust.org.uk).

From both amenity and educational points of view, access to coastal woodlands could still be improved, with better presentation of their historic cultural aspects. Woodlands already provide extensive resources of recreational space which attract many visitors, with the Forestry Commission actively promoting public access. An example of the public outreach that can be achieved, the New Forest National Park is described as "an outdoor classroom for all ages" containing a unique landscape, abundant wildlife and important cultural heritage. Its website (www.newforestnpa.gov.uk) highlights the key topics and issues facing the Park and contains educational student and teacher areas.

Opportunities to raise public awareness of the inter-related cultural, ecological and other aspects of coastal woodlands will be substantially enhanced by the provisions contained in the Marine and Coastal Access Act 2009 to create a right of public coastal access around England's coastline.

CONDITION AND FORCES FOR CHANGE

Coastal woodlands are under many pressures, including management neglect, sea level rise, and an increase in saturated soils and soil salinity which can be detrimental. Increased storminess, which has been linked to global warming, also has serious effects on coastal woodland exposed to the adjacent open space of estuaries and the sea. That effect comes from enhanced coastal erosion, greater penetration of salt spray and direct wind-blown toppling of trees, especially serious for shallow-rooted species such as beech.

On the positive side, the neglect of traditional woodland management techniques is now being addressed in some areas by conservation bodies such as the National Trust and the Woodland Trust, as noted above.

The Marine and Coastal Access Act 2009 provisions for a right of public coastal access around England's coastline offer great opportunities for awareness-raising as commented above but also management issues: erosion problems could be rapid and serious on woodland soils and will need informed and sensitive management along the route and in its maintenance.

There is increasing pressure for the replanting of woodlands in England. This could be a positive force for change if this initiative is guided by an understanding of the known or likely areas of earlier woodlands. A recent change of policy by the Forestry Commission now favours restructuring plantations through their gradual transformation from conifer to broad-leaf (www.forestry.gov.uk).

RARITY AND VULNERABILITY

Coastal woodland tends to occur along only certain areas of the English coastline, with good representation particularly along the southern coastline of Devon and Cornwall, along the New Forest shoreline and parts of the East Anglian coast. To these areas, coastal woodland contributes enormously to seascape and landscape character,

whether viewed from landward or seaward or from within. It is also a highly valued cultural resource, ecological resource and an economic resource drawing many visitors to its areas.

Its vulnerabilities are still chiefly down to neglect, visitor pressure and climatic change. However the cultural conservation values attached to woodland in general for their biodiversity and landscape contributions have become much better recognised and more widely appreciated in recent years. Conservation management techniques are now becoming more widely implemented and the bodies taking the lead in those, especially the National Trust, have substantial coastal woodland holdings on their estates. It is also perhaps to be hoped that many former threats of character change from conifer afforestation of deciduous woodland may have receded for the long term.

PUBLISHED SOURCES

Tapper, B, and Johns, C. 2008. *England's Historic Seascapes. Consolidating the National Method. Final Report*, Truro: Historic Environment Service, Cornwall County Council on behalf of English Heritage

Williamson, T, 2005, *Sandlands: the Suffolk coast and heaths*, Macclesfield: Windgatherer Press

WEBSITES

www.forestry.gov.uk

www.countryscape.org/interact/scapemap/

1.1.12 Broad Character: Enclosed Land

1.1.12.1 Character Type: Reclaimed Land

INTRODUCTION: DEFINING / DISTINGUISHING ATTRIBUTES

This Character Type includes the following Sub-types:

- Reclamation from sea
- Reclamation from tidal marsh
- Reclamation from wetland

The 'Reclaimed land' Character Type refers to areas of land enclosed, drained and taken in from along the coast for a variety of mostly agricultural purposes. It does not include areas of land reclamation designed specifically for urban settlement or port expansion.

Reclamation from sea relates to that for which the topographic or other evidence indicates the land was reclaimed directly from the sea by enclosure and drainage.

Reclamation from tidal marsh relates to that for which the topographic or other evidence indicates the land was reclaimed from tidal marsh, usually salt marsh, by enclosure and drainage. Under 'managed realignment' policies, some areas of this Sub-character Type are being returned to saltmarsh as a buffer against rising sea levels and storm surges.

Reclamation from wetland relates to that for which the topographic or other evidence indicates the land was reclaimed from former wetland that was no longer, or may never have been, tidal. Examples may include reclamation from former fen bogs.

Distinctively flat with wide horizons, areas of coastal enclosed reclaimed lands are often very extensive, sometimes extending far inland and reclaimed over a considerable period. Field patterns in reclaimed land are often defined by networks of drainage ditches rather than upstanding field boundaries, and may in some areas, and from certain periods, reflect the sinuous courses of pre-reclamation saltmarsh creeks. For example, in East Anglia, land reclaimed before 1700 tends to have a serpentine drainage system based on the underlying saltmarsh character, whilst areas drained in

the 18th and 19th centuries are usually rectilinear. Time depth within long-established areas of land reclamation may be evident from the ditch patterning and the size of fields they produce, coupled in some areas with successive lines of former sea wall behind the latest. Some areas of reclamation are maintained by pumping stations, formerly wind-pumps, transferring water into larger channels enclosed by levees draining major areas. In East Anglia, large tracts of reclaimed land are still used as grazing marsh, traditionally grazed by cattle in summer and sheep all year round.

Some areas of land reclaimed from former tidal marsh are having their sea walls deliberately breached under 'managed realignment' policies to return them to saltmarsh as a buffer against rising sea levels and storm surges.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

In England, reclamation (sometimes referred to as 'land claim') on estuaries and coasts has been carried out at least since Roman times, usually on a piecemeal basis. During these early phases, agricultural expansion was often a drive for land reclamation before industrialisation. In East Anglia, large-scale reclamation of coastal wetland began in the Saxon period although rising water levels in the 12th century meant this had to be defended if it was to be saved (Williamson 2006, 19).

Marshland was more widespread in medieval England than it is today, especially around Yorkshire, Somerset, East Anglia and other low-lying coastal areas. Marshland sustained some settlement on higher ground but for the most part comprised meandering creeks, stagnant pools, reed beds, bog, grassland and outcrops of woodland amongst others (Given-Wilson 1996).

The threat of flooding in marshland areas did not discourage some communities from reclaiming marsh for arable land, especially in the 12th and 13th centuries. In East Anglia this reclamation mirrored the same process in the Netherlands and it is possible that Dutch specialists were employed (Williamson 2006, 194). For example, there was extensive land reclamation around the silt ridge in the northern Fenland and the fringes of Romney Marsh. This was often considered common land although some was divided and apportioned to the local community. In many areas, medieval reclamations were developments of earlier efforts with dykes, sea-banks, sluices, weirs and linear drainage channels developing as familiar features in the modern landscape. Yet the history of marshland is a history of inundation as much as reclamation. For example, the flooding of Kent and Sussex marshes in 15th century made significant inroads into earlier gains. These processes partly reflect a rising sea level but also a lessened commitment to maintaining drains and sea-banks in the long period of agricultural depression after the Black Death (Given-Wilson 1996: 31).

In 1585 the General Drainage Act was introduced which meant that large landowners could overrule local proprietors and suppress common rights that obstructed the path of drainage schemes, illustrating the high value accorded to land reclamation by such landowners at this time.

From the 17th century, extensive land reclamation took place around the Wash. It would appear that initial phases of reclamation sought to enclose salt marshes and mudflats with earthen banks for agricultural purposes. These works have been extensive and progressive in England through the centuries, accounting for much of the estuarine habitat loss (Healy and Hickey 2002). The final drainage of the Fens took place in the 19th century following a wave of parliamentary enclosure, leaving a varied landscape (Williamson 2006, 211). The development of wind and later steam and electric pumps facilitated this process. At the end of the 18th century c.50 'drainage mills' were present in the Broads area, by the 1880s there were 110 (ibid, 213).

The most extensive reclamation and enclosure of land took place from the late 18th century onwards, through parliamentary enclosures. Particularly in regions with large areas of common waste, this period saw the systematic enclosure, draining and 'improvement' of coastal marshes and wetlands, as well as reclamation from the sea.

Around Morecambe Bay, in Lancashire and Cumbria, for example, extensive tracts of salt marsh were enclosed, along with the draining of wetlands in the lower reaches of rivers valleys stretching up towards the Lake District mountains.

In East Anglia despite the agricultural recession of the late 19th century when much land reverted to wetland, reclamation continued on some scale through the 20th century, particularly on the Suffolk coast. This was accelerated by the great floods of 1953 which encouraged the populace to construct sea walls and install pumps, transforming the landscape (ibid, 217).

England, like other countries, has a long history of reclaimed land, areas which have often been defended with hard construction techniques like dykes and embankments. During and since the 1990s, this has been brought into question. 'Softer' approaches to reclaimed land, which work with nature rather than against it, have been introduced under 'managed realignment' policies. For example, salt marshes are becoming markedly reduced in area because of what is known as the 'coastal squeeze' phenomenon. This arises when, to protect coasts, sea walls are erected between the land and an intertidal habitat. Due to sea level rise, that intertidal habitat is constrained on one side by the sea and on the other by sea walls. Managed realignment allows the intertidal habitat to naturally move inland where the topography allows, so that it can continue to protect the coast (Luisetti *et al* 2008).

VALUES AND PERCEPTIONS

In some areas of England, coastal land reclamation has been perceived as a habitat loss and reduction in the feeding and over-wintering areas available to various bird species. Conversely, reclaimed land is highly valued by farming interests as an agricultural resource. In the east of England, it has proven to be extremely productive arable land, whilst in the more pastoral landscapes of the north and west it provides good quality grazing land for dairy cows and other stock.

People's interests in and perceptions of industrial history and archaeology are form deep attachments in some areas of England. In East Anglia, the land-drainage wind pumps themselves have become a familiar and characteristic part of the landscape, with many being preserved. Along parts of the coastline in the north-east of England, the coal industry's legacy of physical dereliction and social deprivation has been addressed by a succession of reclamation and infrastructure projects, combining with surviving elements of the industrial landscape to form part of the nation's post-industrial heritage. A good example is provided by the management work of the Durham Heritage Coast Partnership *(*www.durhamheritagecoast.org/). As with all such landscape management initiatives, such reclamation schemes aimed at remediation of land affected by mineral extraction require sensitivity and an integration of many interests and perceptions (http://www.northumberlandnationalpark.org.uk/understanding/geology/minesandquarries).

Coastal grazing marsh created by reclamation is also considered to be an important habitat for breeding wading birds and some plant species, making them highly valued by ecologists and wildlife watchers. In the 1980s, when Halvergate Marshes in Norfolk came under threat of drainage, a campaign of direct action by Friends of the Earth culminated in the establishment of the area as the country's first 'Environmentally Sensitive Area' (ESA).

RESEARCH, AMENITY AND EDUCATION

Multi-disciplinary projects can offer many educational opportunities to investigate the reclamation of saltmarsh and wetlands from medieval times onwards. This might explore farming processes, such as irrigation systems and the management methods used on reclaimed land where it contains historic features including relict field systems and ridge and furrow on the commons.

Pressures for change leading to the re-flooding of former reclaimed land also have considerable effects on people's often long-held landscape perceptions. Public awareness raising initiatives accompanying such proposals for change may be more effective if they recognise those landscape sensitivities, informing and framing the needs for such changes in their historic and cultural contexts.

CONDITION AND FORCES FOR CHANGE

Derelict land has been gradually 'tidied-up' by farmers or expanding housing developments and in certain areas the remains of early industry have been either damaged or destroyed by cliff falls or by subsequent industrial activity. However, the reclamation of some derelict land has provided the opportunity for ecological enhancement, particularly wetlands and woodlands.

In some areas, reclamation of land to the seaward creates a sharp transition between land and sea, giving an artificial edge and reducing a sense of interconnection and gradation between the sea water, the intertidal zone and the land.

In East Anglia, reclaimed land which had traditionally been used as grazing marsh has been increasingly converted to arable land. However there and in some other areas of England, rising sea level may directly affect agricultural land which is currently located on reclaimed marshland if public funding is withdrawn from sea defence maintenance, as is widely happening under Environment Agency policy, or if that policy moves in favour of managed realignment for those areas.

Even before the advent of present 'managed realignment' policies, some reclaimed land had been progressively abandoned or allowed to re-flood for a number of reasons. For example the area around Minsmere was drained in the 19th century only to be flooded in 1940 as an invasion defence.

The increase in the use of managed realignment to control rising sea levels and storm surges, along with the reversion of saltmarsh and wetlands for improvements to biodiversity, are major forces for change affecting this Character Type. At Silverdale, Lancashire, on the east side of Morecambe Bay, large areas of drained and improved former saltmarsh have had existing drains blocked and areas of open water created to create wetland habitats for the internationally important wetland bird population of the Bay. Under Environmental Stewardship schemes, the 'rewetting' of former wetlands and saltmarsh remains a policy priority for the region. In East Anglia, 'managed realignment' policies allowing some reclaimed land to revert to saltmarsh means that reclaimed grazing marsh is becoming rare.

RARITY AND VULNERABILITY

Land that was reclaimed in the medieval period sometimes still exhibits features dating to that period such as strip fields and later features, creating an important cultural landscape which is highly vulnerable if that land is further developed.

It has been estimated that around 50% of the population of the industrialised world lives within 1 km of the coast, a substantial proportion being located around estuaries. This gives rise to concerns about the management of the coastal resource, including the issues of shoreline erosion and sea defence, habitat degradation, pollution and reduction of coastal biodiversity (Healy and Hickey 2002: 366).

Some areas of England play an important role in wildlife conservation and this factor will be a key consideration in programmes of land reclamation, as will habitat creation requirements under the EC Habitats Directive for areas of future land reclamation which are approved.

Where land reclamation is proposed, the landscape inputs to the necessary Environmental Impact Assessment (EIA) will consider that the design of any reclaiming bund structures not only respect historic and natural environment conservation needs

but also relate to the overall shape and scale of the existing shoreline, which, in cases of extensions of existing reclaimed land, will also be culturally defined.

PUBLISHED SOURCES

Given-Wilson, C, ed, 1996. *An Illustrated History of Late Medieval England*, Manchester: Manchester University Press

Healy M, Hickey K. 2002. Historic Land Reclamation in the Intertidal Wetlands of the Shannon Estuary, Western Ireland, *Journal of Coastal Research*: 365-73

Luisetti, T, Turner, R, Bateman, I, 2008. An Ecosystem Services Approach to Assess Managed Realignment Coastal Policy in England, *CSERGE Working Paper ECM 08-04*

Petts, D, Gerrard, C, 2006. *Shared Vision. The North East Regional Research Framework for the Historic Environment*, Durham: Durham County Council

Williamson, T, 2006, *England's Landscape: East Anglia*. London: English Heritage

WEBSITES

http://www.uea.ac.uk/~e130/Saltmarsh.htm

https://www.gov.uk/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities

1.1.13 Broad Character: Unimproved Grazing

1.1.13.1 Character Type: Coastal Rough Ground

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Coastal Rough Ground Character Type includes:

- Rough grassland
- Scrub
- Heathland

Coastal Rough Ground (CRG) includes various forms of very unintensively managed and often unenclosed land which characterise the coastal land periphery of many areas. Such coastal rough ground often contrasts with highly intensively managed areas immediately adjacent inland but also, as a summer grazing resource, it forms an important and distinctive part of the coastal agricultural economy. It also frequently provides a refuge for rare and endangered ecological communities specific to coastal margins. Hence, it is often subject to wildlife conservation designation, especially heathland. Of particular relevance for HSC, coastal rough ground provides the Character Type accommodating much of our coastal access provision and most of our long distance coastal footpaths: the places in which many people experience directly their coastal landscape and seascape perceptions. Typical forms of coastal rough ground are rough grassland, scrub and heath.

Rough grassland encompasses those areas of CRG dominated by unintensively managed grassland. Maintenance of such grassland may be the result of long traditions of coastal rough grazing but in some areas it is now being deliberately re-introduced as a conservation measure to prevent land reverting to scrub.

Scrub encompasses those areas of CRG covered by scrub vegetation: areas dominated by shrubs or bushes of woody plants and sometimes including small trees. Scrub may vary considerably in its openness or impenetrability, and coastal scrub may be dominated by distinctive scrub species. The effect of salt spray blown by strong winds may shape stands of coastal scrub into dramatic asymmetrical shapes that can have a strong impact on visitor's perceptions of such areas and their distinctiveness. In some areas, the development of coastal scrub from rough grassland increased from the late

20th century as grazing stock levels have declined; in response, scrub growth is now being inhibited deliberately by the re-introduction of grazing as a conservation measure.

Heathland encompasses those areas of CRG dominated by dwarf shrubs including heathers and gorses in varying proportions, sometimes in a mosaic with patches of grassland and locally damp areas. Usually on acidic soils in relatively wet areas, they provide a habitat for many rare plant and animal species for which their surviving areas are extensively are frequently covered by wildlife conservation designation and conservation management initiatives.

Historically, coastal rough ground has been mostly used as common grazing. Although many visitors may see these as 'wild, windswept and remote' places, these are highly cultural habitats, the product of thousands of years of human activity, particularly summer grazing management and in many areas, the focus of much extractive industry. They are also now a focus for recreation; long distance coastal footpaths often pass through areas of coastal rough ground.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Many of the cultural imprints of coastal rough ground are expressed in the character of the vegetation and soil profile, coupled with a low density of built features. However where they do occur, typical structural elements may include:

- military defences (e.g. pillboxes, anti-tank cubes, Roman signal stations, fortifications, radar stations)
- prehistoric and historic sites
- finds and field systems (flint scatters, barrows, coin hoards, settlements)
- maritime safety services (e.g. coastguard lookouts)
- navigation aids (e.g. lighthouses, fog stations, landmarks)
- industrial extraction and processing sites (e.g. quarries, mines, limekilns)
- recreational facilities (e.g. caravan and chalet parks, golf links)

Typical vegetation over much coastal rough ground would commonly have been herb-rich rough grassland. After widespread abandonment by farmers during the later 20th century, management neglect has often led to scrub growth, now itself sometimes the subject of conservation management measures.

Much coastal rough ground would have previously been managed as a resource within the farming economy in conjunction with other neighbouring Historic Landscape/Seascape Character Types, principally medieval and post-medieval enclosed land and available areas of common grazing on higher land. As a resource of summer grazing and fuel grounds, it formed an essential element of the coastal mixed farming landscape.

Heathland in particular is formed on areas of sandy soil which are easy to cultivate and were therefore attractive to early farmers with primitive technology (Williamson 2006, 174). The combination of acid soils and grazing pressure encourages a process known as 'podzolisation' in which organic matter and minerals are leached out of the soil (*ibid*). This subsequently allows the development of the characteristic underscrub vegetation dominated by heather (*ibid*). Traditionally the heathland was used for intensive sheep grazing, maintaining its character by not allowing natural processes to convert the land back into woodland.

Other processes and practises which shaped this type of landscape include the harvesting of the natural vegetation for fuel, thatch and animal husbandry, and warrening (rabbit farming). Heathland would therefore have appeared more managed in the medieval and post medieval periods (ibid, 60). Latterly large areas of heath were turned over for permanent cultivation. This process began in the 18th century but

became widespread after WW2 when arable cultivation dramatically increased to boost the economy.

VALUES AND PERCEPTIONS

Coastal rough ground is often well visited by way of coastal paths; much of the 630 miles of the South West Coast Path passes through it. Not only does it provide a recreational and leisure resource for locals and visitors, it also forms the area from which many derive their coastal landscape and seascape perceptions. As a result it probably has a formative influence on people's seascape perceptions far in excess of its proportion of the coastal land area.

Despite that influence, the cultural roles played in the formation and current management of coastal rough ground are probably overlooked by many visitors, feeling these areas offer an escape from urban life and pressures and may well not wish to see that they are still in a highly artificial created land- and seascape. This appeal is reinforced by tourist industry literature that presents these areas as 'wild, windswept and remote' places.

The unintensive character of their management has led to many of these areas being highly valued for their archaeological richness and their levels of biodiversity. Many of these areas contain high numbers of Scheduled Monuments and features recorded on Historic Environment Records (HERs), while concerns about the lowering of biodiversity from management neglect is leading to scrub growth being inhibited deliberately by the re-introduction of grazing in some areas: clearly emphasising the cultural dimension of these areas, and of biodiversity levels. The ecological importance arising from this land's management also attracts many wildlife watchers.

RESEARCH, AMENITY AND EDUCATION

In recent years, archaeological and historic survey, research and documentation of this Character Type has increased our understanding greatly, but there remain many aspects still to be addressed.

Its generally good accessibility has led to this Character Type being key to shaping many people's landscape and seascape perceptions. Its accessibility and recreational use give it a huge potential for informative and educational initiatives, especially where they raise awareness of the cultural dimension of the seascape and the overlapping perspectives to, from and along the coast that are themselves one of the unique land/sea-scape characteristics of the coast in general. Opportunities to realise this potential are substantially enhanced by the provisions contained in the Marine and Coastal Access Act 2009 to create a right of public coastal access around England's coastline.

CONDITION AND FORCES FOR CHANGE

This Character Type is generally well used by walkers and other visitors and this is likely to continue to increase. Some erosion problems could arise as a result and will need informed and sensitive management. That applies too in the routing and maintenance of the England's coastal access route provided for in the Marine and Coastal Access Act 2009. That Act also states that the access will be resilient to coastal change (HM Government 2009). But as noted above, the Act's access provisions also create major public-awareness raising opportunities. While the content will need careful balance to ensure both cultural and natural character perceptions and environmental dimensions are conveyed, the siting of such information provision, where not offered through online resources, will also need to derive from broader visitor management plans for the route.

In some areas such as Suffolk, pressures for change also arise from increased moves to cultivate traditional grazing land and the wide-scale establishment of conifer plantations in areas such as Suffolk.

RARITY AND VULNERABILITY

Agricultural economic forces and recreational pressures have left much coastal rough ground at risk from neglect and visitor erosion in recent years. While still present, this risk is now recognised and the various cultural and ecological values which bear on this Character Type are now prompting measures to reverse its management decline and maintain its character. Creation and maintenance of the new public access route across England's coastline will need care and sensitivity to harmonise with coastal rough ground's management needs.

Very little of England's ancient heathland survives (http://www.forestry.gov.uk/england-heathland), leading to the designation of most remaining areas such as the Suffolk Coast and Heaths AONB and the National Park status of the New Forest.

PUBLISHED SOURCES

HM Government. 2009. *Marine and Coastal Access Act 2009*, London: HM Stationary Office Ltd

Williamson, T, 2006, *England's Landscape: East Anglia*, London: English Heritage

WEBSITES

https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

1.2 South West England Regional Perspective

The region of 'South West England', as defined by English Heritage, is greater in extent than the current project area and includes the coastal and maritime extent of the Bristol Channel and Severn Estuary HSC project area, and the western section of the Hastings-Purbeck HSC project area as far as Highcliffe, Christchurch, Dorset.

The following Regional Perspective HSC Character Type texts were originally completed in February 2011 for the Bristol-Severn project area by Historic Environment Projects, Cornwall Council and SeaZone Solutions Ltd following comment from Dave Hooley, EH.

In this report, the 2011 texts for the South West England region have been taken, and where necessary updated with the results of the South West Peninsula HSC project.

1.2.1 Broad Character: Navigation

1.2.1.1 Character Type: Navigation Features

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type relates to areas created for, and directly relating to, the passage of shipping traffic. This Character Type is found where active management has been undertaken to maintain the accessibility of a stretch of water for safe passage. In relating to active management of material portions of navigation route across hazardous areas, this Type is distinct from the 'Navigation Activity' Character Type which is defined by usage and/or regulation.

As trade increased from the medieval period onwards, especially after the discovery of the New World, greater volumes and larger vessels sought access to what had been traditionally hazardous and restricted river and estuary channels in the region. Industrialisation forced port authorities to improve and maintain navigation access by dredging, and the spoil was often dumped out to sea. Creating channels also involved the reclamation of adjacent land, sandbanks and saltmarsh, and the construction of retaining walls.

This Character Type is found across the region, in particular, in the rivers Severn and Fal, Plymouth Sound and Poole Bay, the entrances to the harbours and anchorages are characterised by dredged channels/areas to provide a safe approach to these active maritime areas.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Dredging was carried out from the later medieval period, the Cattewater, for example, was one of the principal anchorages for English and continental shipping arriving at Plymouth and considerable efforts were made to protect the area from silting caused by mining activity upstream and the deliberate dumping of ballast which threatened to make the Cattewater unusable for the safe anchorage of ships (Redknapp 1984, 3; Wessex Archaeology 1995, 45).

The silts and discarded ballast were repeatedly dredged, especially during the post-medieval period, and it is remarkable that the relatively well preserved wreck of a 200-300 ton early 16th century vessel was discovered in 1973 during dredging operations by the Department of the Environment (NGR SX 4872 5354). The wreck was lying in less than 10m of water and is believed to have sunk in about 1530. The well preserved finds from the wreck included an iron breech loading swivel gun, brass, lead, iron work, pottery, leather, stone, animal bone and glass (Redknapp 1984, 11; Wessex Archaeology 1995, 45). The wreck, known as the Cattewater wreck was swiftly designated under the Protection of Wrecks Act 1973. Similarly the 17th century Swash Channel wreck was discovered by geophysical survey in advance of dredging at Poole Harbour in 2004. It too is designated under the Protection of Wrecks Act 1973.

Early navigation channels across land were cut by labourers using pickaxes, spades and shovels and the excavated spoil taken away in hand carts. In 1568, for instance, the river Parrett in Somerset was 'straightened' by the cutting by hand of a new straight river to remove meandering horseshoe bend, resulting in '*a more spedie passage of the multitude of the raginge freshe waters of when they come to the Seas*' and improved transportation of goods and merchandise to and from Bridgwater. The former course of the river can be seen in the parish boundary between North Petherton and Bridgwater; the river previously deviated 200m to the north and the length of the new cut was also 200m (Webb (ed) 2010, 29).

During the 18th century, as trade boomed, Bristol outgrew her cramped and crowded quay while the tidal mud berths along the banks of the Avon and Frome became very congested and dried out twice a day. In 1804 work began on a man-made 'wet-dock' where ships could remain afloat at all stages of the tide. The scheme involved a whole new ship basin, re-routeing the Avon through a cut, three dams, a canal and two new bridges. It cost just over £600,000 and was the Wonder of the South West when it opened in 1809 (Wheatley 2000, 142).

The development of steam engines from the early 19th century made it possible to build dredgers that could clear silt from docks and deepen approach channels. The first ones were bucket dredgers which used an endless belt of buckets rotated by a steam engine; the dredged silt was dumped into a barge alongside the dredger (Stammers 2007, 154-5). An early example is the *Britton* which was used to dredge the approaches to Falmouth.

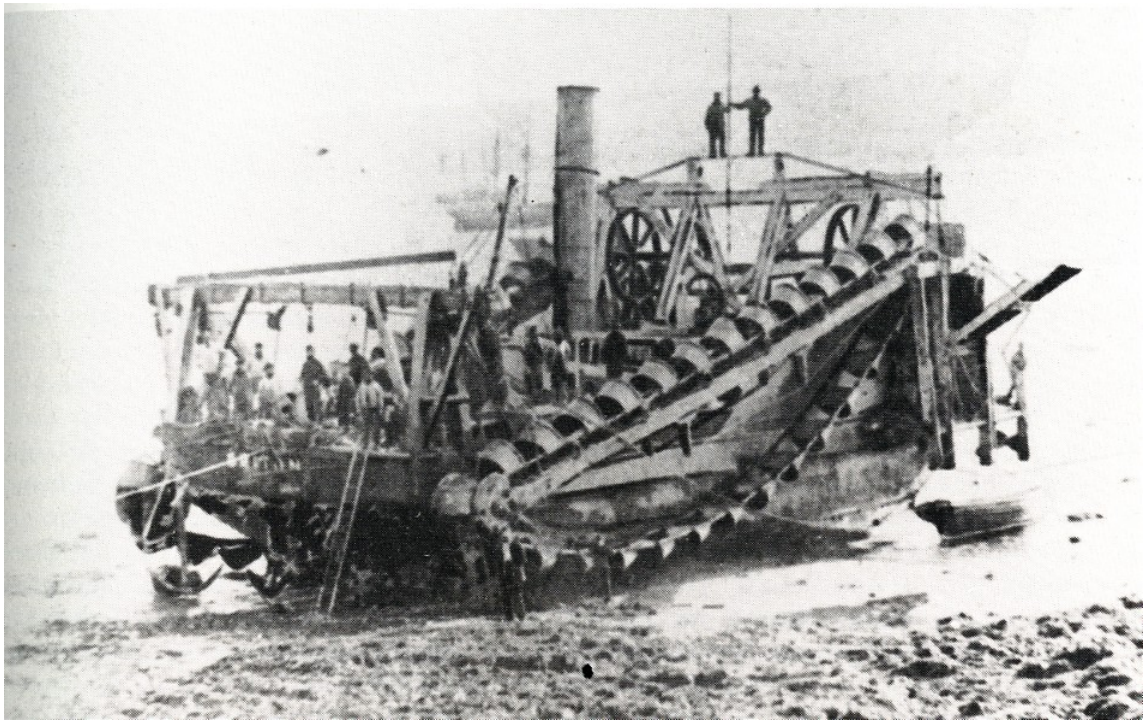

Fig 1 The *Britton*, a steam bucket dredger at Falmouth *c*1860. (Reproduced by kind permission of Falmouth Royal Polytechnic Society.)

Isambard Kingdom Brunel (1806-59) invented a dredger with a lowering spade that could winch itself across a dock to clear away silt from the dock walls; they were in use at Bristol and Bridgewater until the second half of the 20th century, the one at Bridgwater dated to 1844 (Stammers 2007, 55).

Falmouth Docks were originally created in a tidal basin where the water was shallow and needed extensive dredging; by 1860 a channel of deep water 300ft wide had been dredged to connect the Docks with the deep water of Carrick Roads to the east In the later 19th and early 20th century the Dock Company had its own dredger which was

hired out; 'The Dredger and Hopper were returned from Fowey on the 20th September, and after being docked and overhauled, the Dredger proceeded to Pembroke on the 9th November'. In the half-year ending 31 December 1898 the Dock Company earned £776.5s.0d from hire of the dredger and plant.

Grab dredgers were devised by Priestman of Hull in the late 1870s, originally they were just a floating pontoon with a steam crane, but more modern versions are self-propelled vessels with a hold fitted with opening doors to contain the silt. Suction dredgers which use vacuum pumps to lift the silt are the other main sort of dredger; these are widely used for deepening harbours (Stammers 2007, 156).

An interesting example of a non-mechanical method of keeping a channel open is the Gut, a narrow channel through the eastern beach at Porlock Weir in Somerset, used by vessels to approach and leave the main quay and the harbour entrance. Long shore drift from west to east constantly moves pebbles to block the Gut so the pebbles are washed out under pressure of water by collecting and then releasing a suitable head of water within the harbour lock gates. There is documentary evidence that this practice may go back to the early 16th century (Ashford 2010, 49).

The exemplar for this method, however, is probably Hayle in Cornwall which has two large tidal sluicing pools: the wholly artificial Carnsew Pool and Copperhouse Pool, the modified eastern arm of the estuary, which allowed Hayle to participate in international trade, especially for its steam pumping engines.

The course of navigation channels can change over time; the main channel at Padstow has moved from one side to the other of its wide estuary during the last hundred years and is now moving back again. Early in 2010 the shifting sands revealed the remains of a mysterious wreck, thought to be the *Antoinette*, wrecked on the notorious Doom Bar in 1901. The story of the wreck captured the attention of the local people and media (Johns *et al* 2010).

This Character Type has a wide variety of well preserved components from the post-medieval period onwards in the region including active, disused and disused buried navigation channels, dredged channels and entrances to harbours.

VALUES AND PERCEPTIONS

Navigation channels and dredged areas form an important part of working ports or harbours in the region. They also help define the visual character of some coastal areas, perhaps subliminally for many coastal visitors, by creating zones where commercial shipping is a frequent element in the view. Dredging craft are often found moored in harbours ready for service becoming part of the landscape/seascape of the South West local coastal communities.

RESEARCH, AMENITY AND EDUCATION

The history of navigation channels and dredging is an important aspect of the history of the human past, how these navigable routes and these features have been utilised, what remains of them today.

Dredging often reveals the buried palaeoenvironmental remains or important wrecked ships such as the Cattewater Wreck and the Swash Channel Wreck; which are an important resource for studying the history of ships and shipping. Many finds of archaeological interest have been found in the course of dredging and a protocol for reporting such finds has been published by BMAPA and English Heritage (2005).

The educational and research potential of this Character Type is considerable. For example, Falmouth in particular became a major port because of the dredging that took place in the 19th century.

There is potential for research to investigate whether parish and hundred boundaries preserve the lines of buried channels such as the Parret between North Petherton and Bridgewater or the former course of the River Axe west of Brean Cross Pill where there

are traces of a sea bank and hundred and parish boundaries follow its line (Bell 1990, 258).

Recreational watercraft, small boats and anglers are frequent users of the channels in the region (e.g. such as recreational yachting in the Carrick Roads, Falmouth). Carnsew Pool at Hayle is now a RSPB reserve and a popular walk.

At Exeter, an ancient inland port, the basin of the ship canal, built in 1567 and the oldest pound-lock waterway in England formerly, housed the Maritime Museum's ship collection. The area now contains a thriving collection of shops using the canal basin, warehousing and the canal wharfage to lend it a distinctive character.

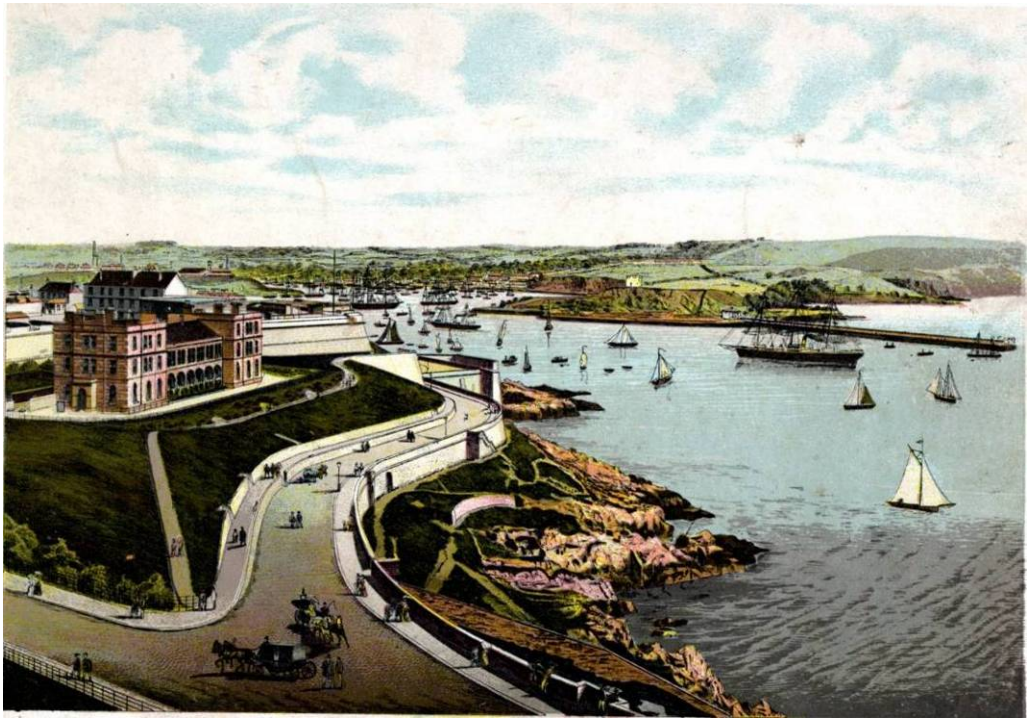

Fig 2 The Biological Institute, Plymouth with Cattewater beyond, c1902

CONDITION AND FORCES FOR CHANGE

Some former navigation channels associated with 18th and 19th century industry have now silted. There is a need for a regular dredge schedule to keep harbour approaches clear and in some cases for much deeper dredging to allow large ships and cruise liners to berth. In some cases this can affect the remains of wrecks buried in the silt or previously undisturbed palaeoenvironmental deposits.

There is the possibility that the dumping of dredged materials may introduce contaminants to the marine environment (Department of Trade and Industry 2002).

RARITY AND VULNERABILITY

Many navigable channels are now lost or buried, for example Sidmouth's days as a port ended when silt and shingle made it unsuitable for navigation, although small fishing boats still use the beach near the river mouth while Padstow was a major port until the mid-19th century when silting created the Doom Bar and prevented larger ships using the harbour (Wheatley 2000, 124, 133).

In areas that are continually dredged today, the potential of prehistoric and historic remains is low due to dredging having an intrusive impact on the seabed and river banks. However, in some places, they may be remnants of historic dredging activities, such as the Carrick Roads and Plymouth Sound.

PUBLISHED SOURCES

Ashford, P, 2010. Porlock Weir's Quay and Trade Development, 1420-1790, in A J, Webb, ed, 44-69

Bell, M, 1990. *Brean Down excavations 1983-1987*, English Heritage *Archaeological Report* **15**, London

BMAPA and English Heritage, 2005. *Protocol for Reporting Finds of Archaeological Interest*, Salisbury: Prepared by Wessex Archaeology on behalf of BMAPA and English Heritage

Department of Trade and Industry, 2002. *Strategic Environmental Assessment of Parts of the Central & Southern North Sea SEA 3*. London: DTI

Hampshire and Wight Trust for Maritime Archaeology, 2007. *Aggregates to Outreach: Presentation and Teaching Pack Final Report*, Southampton: Hampshire and Wight Trust for Maritime Archaeology on behalf of English Heritage

Johns, C, Camidge, K, and Northover, P, 2010. *Possible Wreck of the Barque Antoinette, Camel Estuary, Padstow, Cornwall: Undesignated Site assessment and Emergency Recording,* Historic Environment Projects, Cornwall Council

Redknapp, M, 1984. The Cattewater wreck, *BAR Brit Ser* **131**, Oxford

Stammers, M, 2007. *The Industrial Archaeology of Docks and Harbours*, Oxford, Tempus

Webb, A J, ed, 2010. *A Maritime History of Somerset, Volume 1: Trade and Commerce*, Taunton: The Somerset Archaeological and Natural History Society

Webb, A J, 2010. Drainage, Navigation and Civil Engineering: Straightening the River Parrett on 1568, in A J Webb, ed, 2010

Wessex Archaeology, 1995. *Plymouth Sound Maritime Archaeological Recording project – Rapid Assessment* (draft), Salisbury: Wessex Archaeology

Wheatley, K, 2000. *National Maritime Museum Guide to Maritime Britain*, London: Caxton Editions

WEBSITES

http://splash.wessexarch.co.uk/2008/07/02/swash-channel-wreck/

http://archaeologydataservice.ac.uk/archives/view/bmapa_eh_2006/

http://www.nmmc.co.uk/

1.2.1.2 Character Type: Navigation Activity

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

Lying at the junction of the Irish Sea, the Celtic Sea, the Atlantic Ocean and the English Channel, the South West peninsula is the first part of England to be reached by ships coming in from the west, and the final port of call for those leaving. Because of their geographic and strategic position Bristol, Plymouth and Falmouth have been and continue to be among the most important of England's ports and harbours, while St Mary's Roads in the Isles of Scilly provides the first sheltered anchorage for those crossing the Atlantic.

This Character Type identifies areas characterised by human activity directly relating to the passage of shipping traffic, such as navigation routes, anchorages and ferry crossings, including intimately associated areas and features such as buoyage at anchorages, and ferry crossing terminals. Physical demarcation of such areas varies and may be only partial, if present at all: their definition may be largely or wholly by legal designation or custom and usage.

Ferries have run across the Severn, notably from Aust to Beachley, since at least the twelfth century. Shorter ferry routes around the region, particularly across the rias of Cornwall and Devon provide or have provided ferries for foot passengers. Vehicle ferries can be found at King Harry Ferry on the Fal, Bodinnick on the Fowey, Torpoint on the Tamar, and Dartmouth. Longer distance ferries operate from Weston-Super-Mare to Steep Holm, Ilfracombe and Bideford to Lundy, Penzance to St Mary's, Plymouth to Roscoff and Santander, and Weymouth to the Channel Islands.

Proposals for a new network of ferry routes across the Bristol Channel are proposed, the first between Swansea and Ilfracombe; such routes would reinstate connections between ports in the Bristol Channel that have lapsed since the advent of road and rail transport.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

This Character Type has been shaped by exploratory navigation and coastal trade routes from the prehistoric period onwards. Until the early 19th century absence of metalled roads and railways, rivers and the sea provided the easiest means of transport. Archaeological evidence demonstrates that intricate long distance communication networks along the Atlantic seaboard were established in the Neolithic period and continued into the Bronze Age and Iron Age. The large reserves of tin in Cornwall and Devon gave rise to a significant trade as tin is a key constituent in bronze (Maritime Archaeology Ltd 2007, 86). In 1992 crudely shaped ingots of pure tin from a wrecked Bronze Age ship were discovered at the mouth of the River Erme in south Devon. The tin may have been mined on Dartmoor and brought down the Erme or the Avon to the sea for trading. In 1977 bronze swords and axes had been found at Moor Sand, south Devon, possibly indicating a lost cargo being brought to the south west by the sea route from north west France (Cunliffe 2001, 246, 256; Fenwick and Gale 1998, 38-31).

Prior to the Roman conquest of Britain there was a thriving continental trade in wine and other goods, with Hengistbury Head being an important port for this trade (Cunliffe 2001, 417). It is possible that knowledge of Celtic art was introduced to Britain during the 4th century BC by two routes, via Brittany to the South West and to the east coast by way of the North Sea (Cunliffe (2001, 326-7).

The Romans used the confluence of the rivers Avon and Severn and an anchorage for galleys: the Severn was known to them as *Sabrina* (Wheatley, 2000, 140). During the Roman period seaborne trade would have included lead from the Mendips, as well as the tin from Cornwall and Devon. Recent archaeological work suggests that the Roman military exploited mineral resources (tin, iron and silver) with important and significant sites located at the uppermost reaches of navigable routes on the Tamar (Calstock) and Fowey (Restormel) (Hartgroves and Smith 2008; Nowakowski 2011).

There is much evidence that trade continued in the post-Roman era; luxury goods from the Mediterranean were imported to Tintagel on the north Cornwall coast. Excavations at Bantham Ham in south Devon in 2001 examined occupation which yielded radiocarbon dates centering on the late 5th and early 6th centuries, finds included a major and unusually well-preserved assemblage of post-Roman Mediterranean amphorae was recovered (Reed and Bidwell (2007).

During the medieval period wool became England's main export. Early boats were small with a shallow draft enabling coastal craft to go far upriver to ports such as Tregony and Truro in Cornwall, Topsham and Exeter in Devon. As ships became larger, estuary harbours came into their own and later deepwater anchorages were established such as Plymouth, Fowey, Falmouth and Bristol.

Plymouth Sound is one of the finest natural harbours in the world. Originally a fishing village named Sutton Harbour; it became a major trading port in the 13th century, and because of its geographic and strategic position was heavily involved in trading and warfare, especially with the French and Spanish (Wessex Archaeology 1995, 43;

Wheatley 2000, 127). In the late 14th century Plymouth and Dover were the only two seaports licensed for the sailing of pilgrims to Continental sacred places (Salmon 1920, 39).

Trading networks across Europe continued to expand during the medieval period and several important trading confederations such as the Hanseatic League emerged. The English Channel became a highway between England and the continent, with Bristol, Southampton, London and the Cinque Ports being favoured points of transit. There was also an increase in hostilities which, together with an increase in seaborne trade, had a large influence on the development of shipping. Vessels dating from this period include larger clinker built merchant vessels called keels, cogs and possibly reverse clinker built vessels termed hulks. These were able to accommodate bigger cargoes and, with the addition of temporary fore and aft castles, could also have a military function (Friel 2003, 47, 70).

Fig 3 Dartmouth Castle and St Petrox Church, Devon (Reproduced by kind permission of Ben Williamson)

England's trade with Iceland probably began in the early 1400s and was first developed by the ports along the east coast. It was later dominated by Hull and Bristol (Friel 2003, 67).

The deep water anchorage Dartmouth was the assembly point for many fleets including the Second and Third Crusades in 1147 and 1190. By the early Tudor period it was the most heavily defended port in England (Wheatley 200, 126).

From the early 16th century, following the European contact with the New World, ports on the Atlantic seaboard of Europe became more important; in England particularly Plymouth and Bristol. In 1497 John Cabot, a Genoese seaman settled in Bristol, set out westward in the *Matthew* search of a north-west passage under letters patent from Henry VII, and discovered Nova Scotia and Newfoundland. During the later 16th century many of England's greatest and most adventurous mariners were Devon men: John Hawkins, Martin Frobisher, Francis Drake, Richard Grenville and Walter Raleigh. It was from Plymouth that the Pilgrim Fathers sailed on the *Mayflower* to New England in September 1620.

In 1994 a late 16th or early 17th century wreck was discovered at Salcombe, south Devon which contained a large quantity of Moroccan gold coins and other rich artefacts,

although there was nothing left of the ship. It is thought that she could have been a German trader or a pirate ship - this was a time of intense Barbary pirate activity along the south coast.

In the 17th and 18th centuries Bristol was one of the world's greatest ports; the second city in England after London handling 10% of the nation's trade (London handled over 50% until the second half of the 20th century). When the monopoly on the African trade was lifted in 1698 Bristol was the best placed port to take advantage of the new freedom and overtook London in the trade in about two decades, a place she held until about 1750 when Liverpool took the lead. Many ships traded directly from Bristol to Jamaica for sugar and to Virginia or South Carolina for tobacco.

Many of the smaller ports of the South West have had important overseas trades in addition to their coastal business. In Dorset, Poole and Weymouth made use of fine natural harbours for their trade while Lyme Regis and Bridport had to struggle to keep their harbours open; all had extensive American trade. In north Devon the rival ports of Barnstaple and Bideford, and Exeter and Dartmouth in the south of the county took advantage sheltered quays on their river estuaries and developed important overseas and coastal trade (Bone and Dawson (eds) 2006, 227). 'To Falmouth for orders' was a famous maritime phrase and in the 1840s a local paper reported 'Two hundred sail of merchantmen chiefly corn-laden, awaiting orders' in the Falmouth Roads (Wheatley 2000, 119). Falmouth was also of national strategic importance as Britain's first maritime port of call for shipping entering the Western approaches from the west.

Commercial shipping routes can be fixed by tidal ranges, onshore facilities, and, in the case of the Bristol Channel, by natural obstacles such as the island of Lundy around which vessels must deviate. Early sailing directions give a flavour of the challenges of the approaches to the channel advising that the south of the island is the 'most frequented side thereof, as not to subject borrowing on the dangerous indraughts and bays of the Welsh coast' (Denham 1832, 2). These directions provided valuable, and sometimes colourful, information for masters previously unacquainted with areas. For instance Culver Sand is described as 'one of the most obnoxious shoals in the Bristol Channel' (Denham 1839, 22).

An extract from William Wyrcestre gives a flavour of shipping waiting to enter Bristol in the 15th century:

> *Black stones are in the Severn at Hollow Backs, 4 miles from Bristol beyond Hung Road, where ships and boats wait for the new tide. And the said small rocks are covered by the sea when the tide begins to flow from the Severn up to Bristol by King Road, Hung Road, Ghyston Cliff and -; no sooner has this flow of sea begun than all the ships at the Hollow Backs from Spain, Portugal, Bordeaux, Bayonne, Gascony, Aquitaine, Brittany, Iceland, Ireland, Wales, and other parts weigh their anchors and set sail for Bristol*
>
> (from Harvey 1969)

With the advent of the steam engine, iron hulls and the screw propeller and their widespread use from 1820 there was a significant transformation in shipping. This technological revolution altered shipping in terms of both trading and military vessels (Friel 2003, 226). During the first part of 19th century coastal trade was dominated by wooden sailing vessels such as schooners, brigs, brigantines and snows; however with the development of steam technology there was a rapid decline in these wooden sailing vessels. The capabilities of iron hulled vessels combined with steam propulsion made long-distant trade both faster and more economic. This led to a period of increased prosperity reflected in the large volume of coastal trade, much of which involved transporting coal and other raw materials. The SS *Great Britain*, the first ocean ocean-going, propeller-driven ship designed by Brunel and launched in Bristol in 1843 was the most revolutionised the face of transatlantic shipping (Wheatley 2000, 151-2).

During this period the Royal Navy was the world's leading naval force. British warships rapidly developed from iron hulled vessels such as the HMS *Warrior*, now moored at Portsmouth Historic Dockyard, to the first big-gun, all iron-built, armoured battleship HMS *Dreadnought*. *Dreadnought* was also the first battleship to use an oil-fired steam-powered turbine engine. Further developments during this period include the first submarine, *Holland I,* acquired by the Royal Navy in 1901. Around the south and south west coast of the UK and the English Channel wrecks from this period are particularly prevalent, with four being protected under the Protection of Wrecks Act (Maritime Archaeology Ltd, 2007, 83).

During the two World Wars (WW1 and WW2) the British Isles saw a great deal of maritime activity, which left its mark in the form of shipwrecks, armament remains and crashed aircraft. Enemy submarine activity was particularly high and a great deal of shipping was lost through submarine attacks. This was the first hostile use of submarines in European waters; they had been successfully used during the American Civil War. WW1 also saw the first use of air power at sea. Although they were mainly used for patrol and reconnaissance, this led the way for their use in supporting fleets at sea in WW2 (Friel 2003 238). During WW2, with better equipped warships, U-boats and aircraft the scale of offensive shipping operations increased, leading to an increase in recorded losses. These are reflected by the increased number of wrecks from this period in the waters off Britain (Maritime Archaeology Ltd 2007, 84). The biggest single naval operation of the war was 'Operation Overlord', the Allied invasion of Normandy from D-Day, 6 June 1944. Ships for the invasion were based in many parts of the UK, but the most significant invasion ports were on the south coast, including Falmouth, Plymouth and Poole (Friel 2003, 248-9).

During the 20th century Britain needed increasing quantities of oil and, for safety reasons and ease of unloading and storage, specialised oil terminals were developed in the inter-war years away from existing ports. The first British oil terminal was Skewen near Swansea which opened in 1922, but others soon followed such as Avonmouth near Bristol (Friel 2005, 268).

Typical components of this Character Type include: shipping routes, wrecks and associated materials, quays and docks, warehouses, landing points, and quarantine stations.

Fig 4 Salcombe ferry, Devon. (Reproduced by kind permission of Ben Williamson)

VALUES AND PERCEPTIONS

Historically, navigational activities in the South West have served as a means of linking different places and people. The people living along its coasts exploited the sea as a means of communication and trade and were culturally, economically and possibly politically linked closely together.

Most people, viewing from land, are unlikely to perceive the scale of navigation and shipping that goes on offshore; most vessels will only be perceived as small specks on the horizon. Inshore fishing activity and leisure craft, however, will be more readily perceived as they sail in and out of the harbours and ports along the coast, the most direct link between the coastal communities and their ties to the sea. Specific areas will be known to fishermen as being particularly rich fishing grounds for lining, netting or potting and wreck sites will be favoured by anglers and recreational divers alike.

Nevertheless for some the sea will always hold special meaning and evoke important feelings of sense and place, often encouraging creative and artistic responses. In the past it was equally, if not more so, the case. In prehistory long-distance journeys may have been essential for aspiring members of the elite classes, a rite of passage during which the necessary 'foreign knowledge' was accumulated. The sea may have acted as a liminal space; a long-distance journey where one would disappear from view and enter different worlds was a leap of faith. The activity of seafaring would have had the power to create specific social identities, binding crews into closely knit groups. When understanding long-distance exchange and its socio-political significance the process of navigating and the product traded were indivisible (Van De Noort 2006, 284).

RESEARCH, AMENITY AND EDUCATION

The 'England's Shipping' project utilised historical sources to identify historic routes and navigation activity areas followed by vessels prior to the 1730s, aiming to facilitate a fuller appreciation of maritime potential through the development of a digital atlas of historic shipping patterns (Wessex Archaeology 2003, 2004). Although document-led, this type of work could provide useful tools to target future fieldwork to help identify unknown or undocumented wrecks in the South West area.

There is considerable potential for further research into possible unknown and undocumented wrecks from various periods dating back to the Iron Age or earlier around the South West coast. This may be initially documentary-led followed and corroborated by targeted field work.

Archaeology continually provides new insights into early navigation activities and trading routes, for example the recent excavations at Bantham Ham in south Devon (Reed and Bidwell (2007) or the Time Team investigations at the Roman-period trading centre at Lellizick near the mouth of the Camel Estuary in Cornwall (Wessex Archaeology 2008).

There is much evidence that trade continued in the post-Roman era; luxury goods from the Mediterranean were imported to Tintagel on the north Cornwall coast. Excavations at Bantham Ham in south Devon in 2001 examined occupation which yielded radiocarbon dates centering on the late 5th and early 6th centuries, finds included a major and unusually well-preserved assemblage of post-Roman Mediterranean amphorae was recovered (Reed and Bidwell (2007).

Initiatives integrating research into Information and Communication Technologies (ICT) could bring this Character Type into schools to raise awareness about the region's maritime legacy and its characteristics. Furthermore, as the pilot projects for HSC have shown, the character-based understanding conveyed by such projects has great potential for raising public awareness and open up new perspectives about offshore activities that often go unnoticed to those more familiar with onshore living.

CONDITION AND FORCES FOR CHANGE

Inevitably navigation practice and areas change through time as vessel construction, type and size evolve. Navigation areas and routes can be expected to reflect the dominant industries, fishing and recreational activities of any given time and place. As such, documenting these activities is key to understanding the navigation areas and routes associated with them.

The ten years after 1945 was a prosperous period for the British shipping industry, reflected in Britain having one of the world's largest merchant fleets. This was mainly due to the lack of foreign competition and high freight rates (Friel 2003, 277). Since the 1960's the British shipping industry has been in decline due to competition from ships run under flags of convenience which have undercut the rates of UK owned and registered fleets but much trade is still carried on by shipping that uses the navigation rotes of the English and Bristol Channels and the Irish Sea.

There has also been an increase in marine leisure craft with its associated mooring and berthing facilities and the great variety of ports, harbours and havens around the South West coast are ideally suited to this (Maritime Archaeology Ltd 2007, 84).

Wreck conditions vary considerably depending on the materials and construction techniques used for the original craft. Local environmental conditions also impact considerably on the survival state of wrecked vessels. Anchoring by large craft may impact on any archaeology resting on the seabed. Un-seaworthy vessels also represent a considerable threat to the marine natural and historic environment with pollution and lost cargoes potentially damaging.

RARITY AND VULNERABILITY

The rarity and vulnerability of this Character Type is related to people's changing navigational activities through time. Shipwrecks provide an indication of those activities and there are said to be 250 wrecks per mile of coast in the South West; Lyme Bay, for example, was known as the 'Bay of a 1000 Wrecks' and 772 wrecks are recorded around the Isles of Scilly.

Most wrecks derive from the early-modern period (1750-1900) and are related to coastal trade and fishing. Further offshore, they become more dispersed although clusters do occur in some areas over foul grounds and off the Eddystone Reef in particular.

PUBLISHED SOURCES

Aughton, P, 2000. *Bristol: A People's History,* Lancaster: Carnegie publishing, Ltd

Bone, M, and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in C J, Webster, ed, *The Archaeology of South West England, South West Archaeological Research Framework: Resource Assessment and Research Agenda*, Taunton: Somerset County Council, 213-68

Cunliffe, B, 2001. *Facing the Ocean: The Atlantic and its Peoples*, Oxford: Oxford University Press

Denham, Lieut H M, RN, 1832. *Remarks and sailing directions relative to Lundy Island and the north coast of Devonshire between Hartland-Point and Combe-Martin*, Liverpool: J and J Mawdsley

Denham, Lieut H M, RN, 1839. *Sailing directions for the Bristol Channel*, London: Hydrographic Office

Hartgroves, S, and Smith JR, 2008. A second Roman fort is confirmed in Cornwall, *Britannia* ***39***, 237-239

Fenwick, V, and Gale, A, 1998. *Historic Shipwrecks Discovered, Protected and Investigated*, Oxford: Tempus

Friel, I, 2003. *Maritime History of Britain and Ireland*, London: The British Museum Press

Maritime Archaeology Ltd, 2007. *SEA8 Technical Report: Marine Archaeological Heritage*, Southampton: Maritime Archaeology Ltd

Nowakowski, J A, 2011. Appraising the bigger picture – Cornish Iron Age and Romano-British lives and settlements 25 years on in *Cornish Archaeology* **50**, 241-261

Reed, S, and Bidwell, P, 2007. *Excavations at Bantham, South Devon and Post-Roman Trade in South West England*, Exeter: Exeter Archaeology

Salmon, A L, 1920. *Plymouth*, London: SPCK

Van De Noort, R, 2006. Argonauts of the North Sea – a social Maritime Archaeology for the 2nd Millennium BC, *Proc Prehist Soc* **72**, 267-287

Wessex Archaeology, 1995. *Plymouth Sound Maritime Archaeological Recording Project – Rapid Assessment*, Salisbury: Wessex Archaeology

Wessex Archaeology, 2003. *England's Shipping. Progress Report on Recording and Mapping*, Salisbury: Wessex Archaeology on behalf of English Heritage,

Wessex Archaeology, 2004. *England's Shipping Year 2 report*, Salisbury: Wessex Archaeology on behalf of English Heritage

Wessex Archaeology, 2008. *Lellizick nr Padstow Cornwall: Archaeological Evaluation and Assessment of Results,* Salisbury: Wessex Archaeology

Wheatley, K, 2000. *National Maritime Museum Guide to Maritime Britain*, London: Caxton Editions

WEBSITES

http://ads.ahds.ac.uk/catalogue/archive/bantham_ecc_2007/index.cfm?CFID=4581834&CFTOKEN=47058972 (Bantham)

http://www.nmmc.co.uk/ (National Maritime Museum Cornwall)

1.2.1.3 Character Type: Navigation Hazard

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

'From Padstow Bar to Lundy Light

Is a sailor's grave by day or night'

This Character Type relates to areas that contain serious risks to shipping or smaller craft which could lead to damage or complete loss of a vessel. Such risks may be directly related to sea-floor features such as wrecks and other debris and obstructions, drying areas, submerged rocks, shoals, banks and sandwaves, or they may be indirect, including the implied hazardous water in the water column and surface above such seafloor risks. Strong marine currents and their responses to seafloor and coastal topography can also pose serious hazards from water turbulence.

Major navigation hazards have figured on the earliest Admiralty charts and are often mentioned in historic sailing directions for the South West. Early charts are less accurate than modern charts due to the survey methods used. The majority of features associated with this Character Type are typically found on or immediately adjacent to the coast, although wrecks have a wider distribution in the region. Particularly important natural hazard areas in the South West region include the Cornwall peninsula, Isles of Scilly, Lundy Island, and the Bristol Channel.

The Isles of Scilly are the first landfall in the Western Approaches. This archipelago of some 200 islands, islets and rocks has always been a major navigational hazard. The wreck of Sir Cloudesley Shovel's fleet on the Western Rocks in 1707 with the loss of

four ships and 1,569 men led to the Longitude Act of 1714 which offered a prize of £20,000 to any one who could find an accurate means of determining longitude at sea, a problem that was eventually solved by Thomas Harrison (Larn 2006).

Fig 5 Portland Lighthouse, Portland Bill. (Photograph; Cornwall Council.)

At Land's End the shipping routes divide, vessels for Bristol, Wales, Liverpool and The Irish Sea passing the north coast of Cornwall and those for the English Channel, the North Sea and the Baltic passing along the south coast (Larn and Carter 1969, 12-13).

The north, Atlantic, coast of Cornwall and Devon is one of the wildest and most dangerous of coastlines. The entire length of coastline between the Longships off Land's and Lundy Island was unlit until the mid 19th century and during an Atlantic storm there was no safe harbour until Bideford Bay or the Bristol Channel (Carter 1970, 11-12).

The south coast has many safe harbours; Mount's Bay, Falmouth, Fowey, Plymouth Sound, but a gale from the south and east turns these into a dreaded lee shore. The Lizard Point, the Manacles off St Keverne and the Eddystone Reef of Plymouth are all notorious shipping hazards.

Hazards can not only be caused by rocks, islands, headlands and reefs but also due to water movements caused by tidal streams with shifts in their force changing with the stage and strength of the tide, sometimes exacerbated by swell and the direction of the wind. The 'Shambles' off Portland is an infamous tidal race, and a notable hazard, which has had a major effect on inshore and offshore navigation routes in the past and present.

Historic areas and routes of navigation faced notorious local hazards, people often being alerted to their presence by landmarks, navigation aids and by innovative life-saving institutions. The first Cornish lifeboat station was established at Penzance in 1803 (Noall 1989, 3).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Mariners have been faced with the tempestuous nature of the South West waters since prehistoric times. The strategic importance of the area increased from the later 15th century following the discovery of the Americas.

The areas in which there is a higher occurrence of shipping losses are either areas where environmental factors have created navigational hazards such as submerged reefs, shallow sand banks or windward shores or areas where anthropogenic factors have contributed to a higher incidence of loss such as the location of sea battles or water-ways where the loss of shipping during the two World Wars has been caused by mines, submarines or other discrete enemy action. These losses show less patterning in their number and distribution (Maritime Archaeology Ltd 2007).

In comparison with other regions in England, high numbers of vessels have been lost in the region, including aircraft. There are, for instance, some 772 recorded wreck sites in the Isles of Scilly, and many more unrecorded wrecks. Wrecks of considerable stature located within 10m of water have been generically categorised in the UKHO dataset as dangerous. This is because these wrecks present a greater threat to current shipping and fishing vessels than those in deeper waters. These records illustrate the historic character of the region, including shipping routes or battle areas.

Out of a total number of 61 protected wreck sites around the coast of the United Kingdom, 20 lie off the South West coast: Bartholomew Ledges, a 16th century wreck in St Mary's Sound, Isles of Scilly; the Cattewater Wreck, an early 16th century wreck at the mouth of the River Plym, Devon; Church Rocks, a late 16th or early 17th century wreck east of Teignmouth Devon; the *Coronation* wrecked in 1691 at Penlee Point, Plymouth; Gull Rock wreck, a 15th or 16th century wreck north-east of Lundy; the *Hanover*, an 18th century wreck off Perranporth, Cornwall; HMS *Colossus* wrecked off Samson, Isles of Scilly in 1798; *Iona II* wrecked in 1864 off Lundy; Loe Bar, a possible late 17th century wreck off the south Cornwall Coast; Moor Sand, a 12th century BC wreck off Prawle Point, Devon; the Rill Cove wreck, an early 17th century wreck off the Lizard, Cornwall; the *Royal Anne* Galley, wrecked in 1721 off the Lizard Point, Cornwall; the Salcombe cannon site, a mid-17th wreck off the south coast of Devon; the *Schiedam* wrecked in 1684 off Gunwalloe, Cornwall; the *St Anthony*, an early 16th century wreck off Gunwalloe, Cornwall; Studland Bay, the wreck of an early 16th century Basque vessel in Poole Bay, Dorset; Swash Channel, an early 17th century wreck in Poole Bay Dorset; the Tearing Ledge wreck, Isles of Scilly, probably the wreck of the *Eagle* one of Sir Cloudesley Shovell's fleet wrecked in 1707; West Bay, a 16th or 17th century wreck off the Dorset coast; the Wheel Wreck, Little Ganilly, Isles of Scilly comprises the cargo of a mid 19th century foundry.

The South West has a high number of identified wrecks that could be of suitable importance for designation; this includes a smattering of prehistoric wrecks sites (particularly in Devon), a good number of medieval wreck sites located throughout the region, and an abundance of Stuart (1603 to 1714 AD) and Hanoverian (1714 to 1837 AD) wrecks with particularly strong concentrations on the Isles of Scilly and off the Lizard peninsula, Cornwall (Wessex Archaeology 2013).

In addition there are seven wrecks designated under the Protection of Military Remains Act 1995: UB *65*, HMS *Warwick*, HMS *A7*, HMS *M1*, HMS *Boadicea*, HMS *M2*, HMS *Formidable*, and HMS *Blackwood*. All military air crash sites are designated Protected Places under the Protection of Military Remains Act.

Typical components of this Character Type include: historic and modern sandbanks and sand ridge, bars, shoals, scars and scarps, wrecks and obstructions, rocky areas, including exposed rocky coastlines with rocky outcrops, underwater/awash rocks, and maritime debris, wreck clusters, areas of heavy swell and breaking waves, prevailing winds, and tidal range amongst others.

Fig 6 The site of the wreck of the *Royal Anne* Galley, the old Lizard lifeboat station in the foreground. (Photograph; Cornwall Council.)

VALUES AND PERCEPTIONS

Navigation hazards have been on sailors' minds since prehistoric times and these hazards were only perceived by those who knew about them. However, the state of the tide affected whether or not those hazards were exposed or hidden. These hazards became visible in people's consciousness due to the danger associated with them. Very often, tales and myths will be associated with them, evoking old rhymes and songs.

The creation of nautical and maritime charts generally expressed and recorded the knowledge of the surveyed area but they also represented a tool for recording hazards and other dangers associated with the sea.

These hazards, in some cases, brought employment for such as for the Scillonian pilots in the late 18th and first half of the 19th century.

RESEARCH, AMENITY AND EDUCATION

Thousands of wrecks have been recorded in the region. Wrecks are fragile and non-

renewable resources serving as exceptional opportunities to discover our common past as well as important habitats for aquatic life since they act as artificial reefs for entire and unique ecosystems. In this sense, wrecks are seen as beneficial sites of increased biodiversity by marine ecologists. Therefore, further collaborative work between marine biologists and archaeologists would be beneficial to enable a deeper understanding of species living in wreck sites, how they contribute to wreck preservation, and contextualising this information within regional sea dynamics.

Shipwrecks also attract divers, representing unique recreational tools as well as educational ones, allowing a more comprehensive understanding of the different uses and dangers of the sea. Shipwrecks could also be understood as tools linking different places and people providing unique knowledge about our past. This knowledge could be exploited as educational and recreational tools, bringing a distinctive insight to regional and national history.

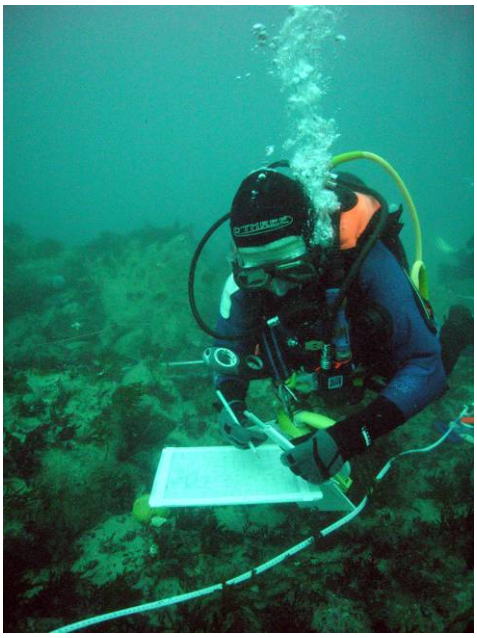

Fig 7 Recording the debris trail of the protected shipwreck HMS *Colossus.* (Reproduced by kind permission of Cornwall and Isles of Scilly Maritime Archaeological Society.)

The Nautical Archaeological Society's 'adopt-a-wreck' scheme aims to develop a sense of ownership and stewardship for the coastal and underwater cultural heritage by encouraging individuals, groups and clubs to adopt maritime sites. Each year those who have adopted and carried out work on a site are encouraged to submit this for the annual Adopt-a-Wreck Award.

CONDITION AND FORCES FOR CHANGE

Thousands of vessels have wrecked over the past centuries on the coastline of South West England. Their preservation will depend, amongst other factors, on the construction materials and the natural environment where they wrecked. For example, exposed wood will have a tendency to decay quicker than iron or steel. Today's prevalent marine conditions will also affect the degree of survival especially regarding the movement of sediments or scouring by currents.

Natural hazards, such as banks, shoals and rocky outcrops amongst others, are subject to natural erosion processes. However, their rate of change and extent may influenced by human-made activities or constructions that change the marine conditions. The changing nature of sandbanks and shoals means the character of the landscape/seascape is in continuous change. This changing nature often reveals material remains that are being covered and uncovered or embedded within such bedforms. The latter will only be revealed after seismic surveys (e.g. see Gaffney *et al* 2007).

RARITY AND VULNERABILITY

Navigation hazards, whether natural or human-made represent a resource for characterising the time-depth of regional landscape/seascape. There may be a link between the occurrence of natural obstacles and the presence of wrecked craft, lost gear or accumulated prehistoric or historic deposits. Regional environmental conditions will also indicate whether there is potential for preservation of prehistoric or historic materials.

The vulnerability of this Character Type is that sandbanks in shallow areas near coastal settings are known to be extremely mobile and may require frequent survey in the vicinity of ports to ensure the safety of navigation (British Geological Survey 2002).

Although maritime transport has been an important form of communication since prehistoric times, most of the known wrecks from this region are of post-medieval date

or later. Most of the wrecks on the north coast are small sailing coasters involved in trade with Wales and Ireland or barques and brigantines from the Americas or the Mediterranean; those on the south coast are more varied (Carter 1970, 12).

Inshore there are significant concentrations of wrecks on the approaches to ports and harbours and in shallow areas illustrating the hazardous nature of these areas. Further offshore, no significant wreck patterns have been identified.

PUBLISHED SOURCES

Carter, C, 1970. *Cornish Shipwrecks: the North Coast*, Newton Abbot: David & Charles

Larn, R, 2006. '*Poor England has lost so many men',* St Mary's: Council of the Isles of Scilly

Larn, R, and Carter, C, 1969. *Cornish Shipwrecks: the South Coast*, Newton Abbot: David & Charles

Maritime Archaeology Ltd, 2007. *SEA8 Technical Report: Marine Archaeological Heritage*, Southampton: Maritime Archaeology Ltd

Noall, C, 1989. *Cornwall's Early Lifeboats*, Penryn: Tor Mark Press

Wessex Archaeology, 2013. *Early Ships and Boats (Prehistory to 1840)*, Salisbury: Wessex Archaeology

WEBSITES

http://www.cismas.org.uk/

http://www.nmmc.co.uk/

http://www.nauticalarchaeologysociety.org/projects/adoption.php

1.2.1.4 Character Type: Maritime Safety

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

'Maritime safety' includes areas containing features usually erected at important or dangerous points on or near the coast for the warning and guidance of mariners, and areas occupied by structures serving the safety needs of coastal or marine users of the sea. Some safety features can be sited well inland, such as church towers and spires used a navigational aids and more generalised place-finders.

The majority of features associated with this Character Type are typically found on or adjacent to the coast but visual aids to position-finding may occur well inland. The dangers to shipping in the South West are very diverse, from the mudflats of the Severn Estuary to the high cliffs of Cornwall. The semi-submerged rocks or 'ledges' of the North Cornwall coast, the Lizard Point and the Isles of Scilly have claimed many shipwrecks.

Many lighthouses can be found in Cornwall (e.g. Godrevy, Longships, the Lizard, Pendeen, Trevose Head), Scilly (e.g. Bishop Rock and Round Island Lighthouses), Devon (e.g. Berry Head, Bull Point, Hartland Point, Lynmouth Foreland, Start Point), Somerset (e.g. Watchet, Burnham-on-Sea) and Dorset (e.g. Anvil Point, Portland Bill) Most of these lighthouses have a permanent visual impact on today's landscape and form iconic aspects of their stretch of the coast.

There are Royal National Lifeboat Institution (RNLI) Stations throughout the region. The first lifeboat station in the region was established at Penzance in 1803, only three years after the earliest example at Sunderland. Their lifeboats are specialised shore-based vessels manned by volunteers, intended for quick dispatch, launch and transit to reach a ship or individuals in trouble at sea. The endurance of these boats and the lifeboat crews is generally determined by the vessel size. Characteristics such as capability to

withstand heavy weather, fuel capacity, navigation, and communication devices carried, range etc. will all vary with size.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The use of landmarks to guide ships safely along the coast and into ports and harbours is another common aspect of maritime safety and probably the oldest method of navigation. These can be distinctive topographic features such as hills or prominent landscape features (e.g. St Agnes Beacon on the north Cornwall coast), or artificial structure such as church spires and chapels (e.g. St Keverne and, well inland, Lanlivery, both in Cornwall), windmills, beacons, chimneys, cooling towers, lighthouses, masts, trig stations and towers). Prehistoric monuments may have been used for this purpose such as, arguably, the Bronze Age entrance graves of Scilly (Robinson 2007). Roman signal stations are also located along the region's coast. Generally found on cliff-tops, there are possible examples located at Pabyer Point and St Gennys (Cornwall) and Martin Hoe and Countisbury (Devon).

During medieval times, rudimentary lighthouses were erected in some places to aid navigation, and they were usually maintained by religious houses and were often small chapels (such as the light kept on St Michael's Mount, St Michael's Chapel on Rame Head which guided vessels into Plymouth or St Nicholas Chapel on Lantern Hill above the harbour at Ilfracombe which still burns a light for sailors).

Fig 8 Start Point lighthouse. (Photograph; Cornwall Council.)

The south west coast also experienced some of the earliest developments in the institutional provision of life-saving facilities. Early coastguard stations, rocket posts and lifeboat stations are shown on the OS map editions.

In general, lifeboats along the South West coast, as elsewhere, were manned by local fishermen because they had local knowledge and because very often members of their community were in danger. Eventually motor lifeboats were introduced. In recent years, the inshore inflatable lifeboat has become increasingly important because it can travel fast and rescue people more efficiently.

Pilotage, the guiding of ships into harbour by a local experienced sailor, is another feature of maritime safety from at least the medieval period and today, it still remains a

vital function. In the Isles of Scilly pilotage of ships through the rocky archipelago was an important component of the local economy until the advent of steamships in the mid-19th century. The fast, manoeuvrable six-oared pilot gigs which took pilots out to the ships remain a part of the islands today: racing pilot gigs is a popular sport and the 'World Championships' are held in Scilly each May. The gig's distinctive design is now copied by competing teams from all around the south west and much further afield.

The South West has some historic lighthouses such as the Lizard famous for its powerful light, and the Bishop lighthouse at the outer edge of the Western Rocks in Scilly (Bone and Dawson (eds) 2008, 228). In 1680 St Agnes lighthouse on the Isles of Scilly was the second to be purposely built by Trinity House (Tarrant 1993). In 1698 Henry Winstanley built England's first lighthouse on a rock in the sea on the Eddystone Reef 28 miles of Plymouth; he later perished with his lighthouse when it was washed away in the Great Storm of November 1703; around Britain the same storm wrecked over 150 ships and drowned approximately 7000 seamen. Winstanley's was the first of a series of lighthouses to be built on the Eddystone. John Smeaton completed his in 1739 and it stood for 130 years, when the rock itself was felt to be unsafe. The top half of the tower was removed to Plymouth Hoe where it remains as a tourist attraction. The bottom part still stands on the rock alongside the Douglass lighthouse completed in 1888 (Hart Davis and Troscianko 2003).

The components of this Type encompass a wide suite of maritime infrastructure: marine navigation aids such as areas of buoys, beacons and lights, land-based navigation aids such as lighthouses, fog stations, daymarks (e.g. churches, beacons, windmills, chimneys, distinctive topography, distance marks and lights), topmarks, distance marks and lights, lifeboat stations, lighthouses and light house accommodation, coastguard lookouts and coastguard accommodation, daymarks. Areas advised or designated as zones of restricted navigation or exclusion for safety reasons are also included.

Fig 9 The lighthouse chapel on Rame Head. (Photograph; Cornwall Council)

VALUES AND PERCEPTIONS

Maritime safety features are an obvious and easily recognised part of any coastline or shoreline. Lighthouses, beacons, and daymarks are iconic monuments bridging the boundary between land and sea. However some sites are less obvious, church spires and towers, buildings and other monuments that were not designed with maritime safety in mind but were utilised nevertheless. These monuments can be seen in a new light once viewed from a maritime perspective.

Navigation aids out at sea, such as buoys, lights, and beacons, are perhaps less obvious to anyone who does not sail although in the darkness they obviously have a more visual impact. However those that employ sound, fog horns and bells have an immediate, if not somewhat ominous pitch immediately alerting the unwary to dangers ahead.

Coastguard and lifeboat stations are an integral part of the South West coast and the cultural identities of coastal communities. They are often being manned by local fishermen because they have the necessary local knowledge and are more aware of the risks at sea and their consequences.

RESEARCH, AMENITY AND EDUCATION

Navigation aids can be understood as giving linkage between land and sea. As such, navigation aids are fundamental to understanding the present and past human-use of the sea. There is considerable documentary evidence and research for this Type which would lend itself to archaeological fieldwork, not only in landscape terms and perceptions but also in terms of the history and chronology of monuments and features.

The use of landmarks and navigation aids greatly facilitated the development of surveying techniques and the drafting of maritime charts and coast profiles (folios). Many of the early charts identify features that no longer exist (windmills on Portland for example) and they may be the only mapped record available constituting an important resource for landscape as well as seascape studies.

It would be beneficial to research, document and map these features whether they are topographical, human-made or accidental. The latter in particular offer a new perspective to our understanding of maritime safety. Plotting the location and understanding the development of coastguard stations along the coast would give valuable information about the development of hazards and preventative methods for coastal trades of all types (Val Baker *et al* 2007).

Lighthouses in the South West have been a source of inspiration and subject matter for many artists and writers, for example James F Cobb's 1920 adventure novel 'The Watchers on the Longships: A Tale of Cornwall in the Last Century' and Virginia Woolf's 'To the Lighthouse' (1927) inspired by Godrevy Lighthouse and summer holidays in Cornwall.

Some lighthouses in the region are also used as amenity and educational resources, being open to the public; the Lizard Lighthouse is now a heritage centre.

CONDITION AND FORCES FOR CHANGE

Navigation aids, particularly those at sea, are often replaced and renewed. Nevertheless, their mooring sites may still hold evidence of successive use, for example fixings, piles and other materials used to anchor these features to the seabed.

Terrestrial markers are increasingly becoming obsolete as radio, satellite navigation; digital marine charts and seismic technologies replace traditional methods of navigation. Similarly the automation of lighthouses has seen the people who operated and lived in these features replaced. Question marks have been raised about the relevance of lighthouses at all in an era of GPS (global positioning system) position-finding, although many have objected for fear of the loss of a feature they see as iconic

in their perceptions of a particular part of the coast, as for example in the reaction to a suggestion that Godrevy Lighthouse in Cornwall might close.

RARITY AND VULNERABILITY

Navigational aids are still prominent features in the coastal landscape but are vulnerable to the elements and to neglect. They also vulnerable to changes in technology as noted in the previous section, and future arguments for the maintenance and retention of costly elements in this Type, such as lighthouses, may rest increasingly on their roles in contributing to land- and seascape distinctiveness rather than in continuing to provide for maritime safety.

PUBLISHED SOURCES

Bone, M, and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in C J, Webster, ed, *The Archaeology of South West England, South West Archaeological Research Framework: Resource Assessment and Research Agenda*, Taunton, Somerset County Council, 213-68

Cobb, J F, 1920. *The Watchers on the Longships: A Tale of Cornwall in the Last Century*, London: Wells Gardner

Hart Davies, A, and Troscianko, E, 2002. *Henry Winstanley and the Eddystone Lighthouse*, Stroud: Sutton Publishing

Noall, C, 1968. *Cornish Lights and Shipwrecks,* Truro: Bradford Barton

Robinson, G, 2007. The Prehistoric Island Landscape of Scilly, *BAR Brit Ser* **447**

Tarrant, M, 1993. *Cornwall's Lighthouse Heritage*, Truro: Twelveheads Press

Val Baker M, Tapper B, Johns C, Herring P. 2007. *England's Historic Seascapes: Scarborough to Hartlepool and Adjacent Marine Types*, Truro: Historic Environment Service Cornwall County Council on behalf of English Heritage

Woolf, V, 1927. *To the Lighthouse*, London: Hogarth Press

WEBSITES

http://www.trinityhouse.co.uk/lighthouses/lighthouse_list/index.html

http://www.lizardlighthouse.co.uk/index.html

http://www.nmmc.co.uk/

1.2.2 Broad Character: Industry

1.2.2.1 Character Type: Extractive industry (Minerals)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

Extractive industry (minerals) refers to imprints from industrial activity focussed on primary extraction of minerals from the earth, including stone, specific minerals, and ores, along with initial processing at extraction sites. It includes coal but excludes hydrocarbons which come under the 'Energy Industry' Character Type. Coverage by HSC is limited to areas of extractive industrial character located along the coast and within the marine zone.

The South West region has a varied geology and many different materials have been, and in some cases still are, of economic importance. These include various minerals and metals, predominately from Cornwall, West Devon and Exmoor; serpentine from the Lizard, slate from North Cornwall, granite from Cornwall and Devon, limestone from Purbeck and Portland, and china clay and ball clay from Cornwall and west Devon. Offshore, marine aggregate deposits are now exploited from off the Dorset coast and several smaller areas along the Severn Estuary and Bristol Channel.

The processes associated with these sub-types have had an effect upon other HSC character types, and conversely the abandonment of some areas by these industries has led to their transformation into other Character Types such as woodland and coastal rough ground.

Marine aggregate deposits (MADs) are sands and gravels of economic value that can be found on the seabed. Marine aggregates are used primarily for building and construction purposes and a substantial proportion of the United Kingdom's need for aggregates is obtained from the seabed. Quarrying for aggregates also takes place extensively on land but largely in other regions. Components of the industry can include quarries, offshore licensed dredging areas, wharves, office buildings, and specifically associated transport systems (such as tunnels, railways and harbours).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The history of aggregate dredging in England began in the 19th century on beaches around the country. The impacts of such activity were felt almost immediately and the destruction of the village of Hallsands in Devon in January 1917 (Straker 2008, 210) is said to have been initiated by the removal of large amounts of sand and shingle from the foreshore between 1897 and 1902 leading to a four metre lowering of the beach and subsequent erosion of the cliffs (Hallsands website).

As a result of concerns over coastal erosion, aggregate extraction from foreshores had halted by the 1960s leading to an increase in offshore extraction. The English Channel is one of two areas identified as having the highest potential for economic deposits of aggregates and licensed extraction areas exist off the Dorset coast. Smaller areas licensed for dredging are located in the Bristol Channel at Culver Sand and the Welsh Grounds. Onshore quarrying for roadstone aggregate continues at Dean Quarry on the Lizard where the stone is still loaded directly onto carriers from a small quay.

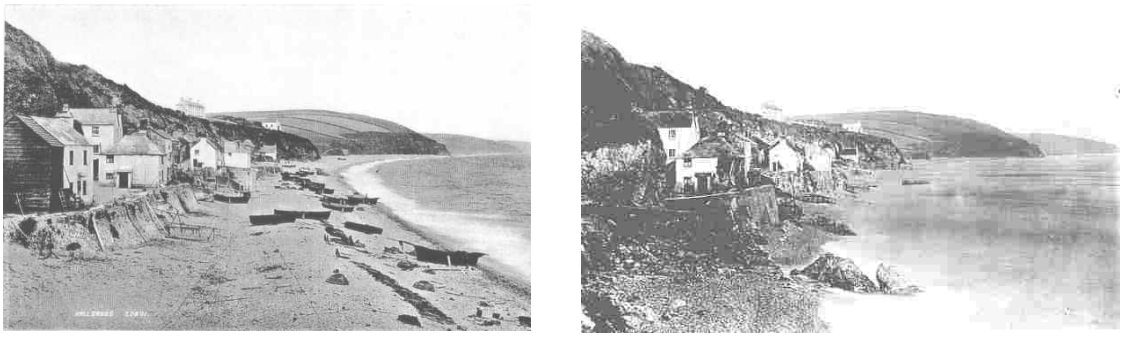

Fig 10 Hallsands in 1894...and 1903, following aggregate dredging (photos from Hallsands website 2011 - http://www.hallsands.org.uk/story.htm)

Quarrying has played a major role in the economic and maritime history of the region. The remains of many slate quarries can be seen along the North Cornish coast. Facilities to export the slates from these, and larger quarries inland at Delabole, existed at Port Gaverne, Penhallic Point, and Tintagel Cove. The early demand for granite was met by moorstone from West Penwith, Bodmin Moor, and Dartmoor, but as demand increased larger quarries were opened and facilities for transport of the material expanded. Much of the stone from the dimension quarries of the later 19th century such as De Lank were carefully cut and dressed and used in major engineering works such as lighthouses (Herring and Rose 2001). Beer Head and the Isles of Purbeck and Portland are renowned for their limestone and are dotted with the remains of quarrying. Quarrying for Purbeck marble and Portland limestone dates back to Roman times for sarcophagi and inscribed stones and to the medieval period for building stone. Much of London was rebuilt using these stones following the Great Fire of London. Portland cement is also manufactured here from raw materials extracted locally (Cement and Concrete Basics website).

The South West is a major source internationally of china clay. Extensive quarrying of the Hensbarrow Downs, Mid Cornwall, and to a lesser extent on Bodmin Moor and the south-western fringes of Dartmoor, has created a unique landscape of large open quarries and associated spoil heaps and infrastructure. Facilities to export the clay, to the potteries of the Midlands, and latterly to the paper mills of Northern Europe, were purpose-built at Par. However, the early 19th century harbour was closed to clay traffic in 2008 and most of the clay is now exported from the deep-water port of Fowey.

Coal mining has had a limited impact upon the historical development of the region's maritime and marine character with the only major reserves being found in the Forest of Dean, and in the area around Radstock near Bristol. In the Forest of Dean, mining has played a part in economic development since at least the medieval period, and possibly earlier. Deep mining, initiated in 1904, survived until 1965 but small-scale surface mining continues into the present at several Free Mines (Forest of Dean Coal Mining website). Records of Purton Pill show that in 1282 seven boats were based here and these were probably being used to transport coal. Some of the earliest tramways in the country were built in the early 19th century to transfer coal to ports such as Lydney and Bullo Pill on the Severn (Mullin *et al* 2009, 25-6).

Less successful coal mining operations have taken place in North Devon, and 'Kimmeridge Coal', in reality an oil-shale, was cut from the cliffs of Dorset from the 17th century onwards (Bone and Dawson 2008, 234).

The mining of metals has a long and significant history in the region with nationally important centres for iron production in the Forest of Dean, for lead in the Mendips, and for tin and copper in Cornwall and west Devon. Evidence for iron ore extraction in the region goes back to the Roman period with furnaces excavated at Chesters Villa on the Severn (Fulford and Allen 1992; Mullin *et al* 2009, 24). Roman ironworking has been identified on Exmoor and more tentatively in Cornwall, adjacent to the Roman fort at Restormel (Smith in Thorpe 2007, 27). It is likely that the smelted metal would have been transported by sea to centres of production. The rise of the Dean industry at the same time as the decline of the Weald may be part of a greater shift in the balance of Roman Britain and as such is worthy of greater study (Fulford and Allen 1992). Lead production in the Mendips is centred on Charterhouse and, although it may have begun prior to the Roman conquest, is concentrated around the 1st to 3rd centuries. Evidence from the distribution of the highly characteristic ingots suggests that the lead was transported by road to the south coast for export to Gaul and beyond (Holbrook 2008, 155). The silver lead mine on Tintagel Island was in operation until the later 19th century.

Tin and copper mining has a rich and diverse history in the South West with tin likely to have been exploited since the beginning of the Bronze Age in Cornwall and Devon. Trade with the Mediterranean world has been inferred from scraps of ancient writings thought to ultimately derive from the autobiographical account of the voyage of Pytheas of Massalia, sadly now lost, who describes tin streaming and the working of the tin into ingots, as well as the customs of the merchants and sailors who traded between Belerion (Cornwall) and Gaul (Cunliffe 2002, 76). In 1992 crudely shaped ingots of pure tin from a wrecked Bronze Age ship were discovered at the mouth of the River Erme in south Devon. The tin may have been mined on Dartmoor and brought down the Erme or the Avon to the sea for trading. In 1977 bronze swords and axes had been found at Moor Sand, south Devon, possibly indicating a lost cargo being brought to the south west by the sea route from north west France (Cunliffe 2001, 246, 256; Fenwick and Gale 1998, 38-31).

Fig 11 Botallack tin mine in Cornwall. (Photograph: Cornwall Council.)

Industrial mining from the 18th century brought great wealth to Cornwall, as well as cycles of boom and bust, and technological innovations associated with the industry spread around the world, along with a great Cornish diaspora. Many of the mines were coastal and the sight of engine houses lining the rugged Cornish cliffs is a powerful national symbol as well as providing landmarks for coastal craft. Many of the coastal lodes will have been identified by miners engaged in their summer occupation of fishing and shafts and galleries may extend out from the coastline for some distance.

More recently, it has been proposed to extract metal ore from sea-floor deposits off the North Cornwall coast. The scheme proposes to extract tin from the sands which could be rich in waste or tailings from historic mines (BBC News article).

Typical components of this Type include: mines, quarries, wharves, dredging vessels, office, storage and factory buildings, mine workings, including open-cast and pit workings, waste tips, dumps, and spoil heaps, and specifically associated transport systems (such as tunnels, railways and harbours). This Type is often associated with Processing Industries and Ports and Docks.

VALUES AND PERCEPTIONS

The Cornwall and West Devon Mining Landscape World Heritage Site bid built on the large base of interest and enthusiasm for Cornwall's industrial past that already existed. There are many people in Cornwall who worked in the industry and the last mine only closed down in 1998. In addition many have family ties to the industry in the form of parents and grandparents. The success of the WHS bid has validated this interest and encouraged others to think of the remains of the industry in a positive light. The remains of the industry are a powerful reminder to many of prosperity and a time when Cornwall was at the heart of the Industrial Revolution.

While operational quarries are sometimes viewed negatively as detrimental to the quality of the landscape, there is local pride in the survival of quarrying at places like De Lank and Bearah Tor on Bodmin Moor, and for many local people the landscape of china clay district around St Austell is a reminder of economic prosperity and a unique local identity. Abandoned quarries may form important recreational areas, and are often valuable wildlife or geological sites. They may also be used as rubbish dumps, both official and unofficial. Footpaths and cycle paths have sprung up across abandoned

workings whilst some pits have gone on to forge new identities in the form of watersports facilities, fishing lakes, and of course the Eden Project, where a recent sculpture uses De Lank granite from Bodmin Moor.

Coal mining in the Forest of Dean is a unique tradition with rights invested in the 'Free Miners'. Members of this body of men must be born within the Hundred of St Briavels and work for one year and one day underground before claiming their birthright. Since the local maternity hospital has closed there would appear to be little prospect of this pool of miners being replenished in the future (Forest Web website). The prospect of losing this strongly held tradition is a powerful manifestation of local pride for many in the area where.

RESEARCH, AMENITY AND EDUCATION

Aggregate dredging may destroy archaeological and palaeoenvironmental evidence and for that reason the Aggregates Levy Sustainability Fund has provided access to funds for a number of projects, predominately dealing with methodologies for marine assessment and evaluation, but also applied projects including this one and another reconstructing the submerged prehistoric landscape of the Arun and Solent rivers in the English Channel (Dellino-Musgrave 2007).

Museums specialising in aspects of this character type can be found within the region. In the Forest of Dean coalfield one of the larger Free Mines at Hopewell Colliery is currently operating as a museum where underground trips may be taken (Forest of Dean Coal Mining website). The china clay industry is well served by the excellent Wheal Martyn Museum, which in addition to exhibits, also has an archive of documentary and photographic material (Wheal Martyn website). Deep mining is represented by the Geevor Tin Mine Museum where underground tours, panning for minerals, experiencing the atmosphere of a miners' dry, as well as a more traditional museum exhibition can all be experienced (Geevor website).

The inscription of the Cornwall and West Devon Mining Landscape as a World Heritage Site in 2006 has created a focus and a framework of understanding for visitors to the various components of the industrial heritage of the area as well as encouraging cultural events with mining themes, lecture programmes covering all aspects of the site, and exhibitions displaying aspects of the landscape (Cornish Mining website). Much research has already been conducted into the history of metalliferous mining in Cornwall, although the period prior to industrialisation is less well served, partly due to a lack of documentary evidence, but also because many early workings will have been destroyed by subsequent activity. Developer-funded archaeology has in the last twenty years increased the body of evidence for past industrial processes.

The presence of quarrying throughout the region has provided an opportunity to display cross-sections through the underlying geology at a large number of locations and many of these are Regionally Important Geological/Geomorphological Sites (RIGS).

The Eden Project, located in a disused china clay pit near St Austell, Cornwall is now a world famous tourist attraction.

CONDITION AND FORCES FOR CHANGE

There are many relict industries in the region, such as tin and copper mining, iron mining, and shale quarrying, which are now disused. Many of them are still visible in today's landscape and others are hidden by overgrown scrub and woodland or are barely distinguishable from other areas of the rocky foreshore. However, some of them are still in operation such as the china clay industry and the Dorset oilfield. Some building stone and aggregate quarries in the region are also active and at least one of the Cornish tin mines, South Crofty, may reopen (Western United Mines Ltd website).

The less intensive nature of the coal industry in the region, and the lack of subsequent redevelopment, has allowed the preservation of an important archaeological resource (Bone and Dawson 2008, 234). The scale of the china clay industry has obliterated

many former remains but the extent of the past operations means that many components, such as kilns, linhays, and settling tanks remain many in a poor condition.

Plans have been proposed to develop Par Harbour as part of one of four Ecotowns approved in 2009 by the government; the proposals include the provision of a marina, facilities for local fishing boats, a covered marketplace, and housing, to fit alongside existing clay processing facilities (Eco-bos website).

RARITY AND VULNERABILITY

Many of the components of these industries are regionally distinctive and locally abundant but also highly valued nationally. This is clearly evident for the mining industry from the granting of World Heritage status to the Cornwall and West Devon Mining Site, but it similar considerations also apply to many of the other industries described here. Many industrial remains are vulnerable to change from later developments on the same site as technologies improve or abandoned brownfield sites are sought for redevelopment.

PUBLISHED SOURCES

Bone, M, and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in Webster, ed, 2008, 213-68

Cunliffe, B, 2001. *Facing the Ocean: The Atlantic and its Peoples*, Oxford: Oxford University Press

Cunliffe, B, 2002. *The extraordinary voyage of Pytheas the Greek*, London: Penguin

Dellino-Musgrave, V, 2007. The Aggregates Levy Sustainability Fund and the Historic Environment, *Marine Data News* **4**, MEDIN website

Fulford, M G and Allen, J R L, 1992. Iron-Making at the Chesters Villa, Woolaston, Gloucestershire: Survey and Excavation, *Britannia* **23**, 159-215

Herring, P, and Rose, P, 2001. *Bodmin Moor's Archaeological Heritage*, Truro: Cornwall County Council

Holbrook, N, ed, 2008. Roman in Webster, ed, 151-62

Mullin, D, Brunning, R, and Chadwick, A, 2009. *Severn Estuary Rapid Coastal Zone Assessment Phase 1 Report*, Gloucestershire County Council and Somerset County Council

Straker, V, 2008. Post-Medieval to Modern Environmental Background, in Webster, ed, 2008, 213-68

Thorpe, C, 2007. *The Earthwork at Restormel Farm, Lostwithiel, Cornwall. Archaeological Site and Finds Evaluation*, Truro: Cornwall County Council

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council

WEBSITES

http://en.wikipedia.org/wiki/Hallsands (Wikipedia – Hallsands)

http://en.wikipedia.org/wiki/Isle_of_Portland#Demography (Wikipedia – Isle of Portland)

http://www.cement.org/basics/concretebasics_history.asp (Cement and Concrete Basics)

http://www.lightmoor.co.uk/forestcoal/Coalintro.html (Forest of Dean mining)

http://www.fweb.org.uk/dean/deanhist/miners.htm (Forest Web)

http://www.eco-bos.com/our-vision/masterplan-sites/par/ (Eco-bos)

http://www.cornish-mining.org.uk/ (Cornish Mining)

http://newsweaver.co.uk/coastmapnews/e_article000873217.cfm?x=bbvr99Q,b6km7Fc2,w (MEDIN)

http://www.westernunitedmines.com/home (Western United Mines Ltd)

http://www.wheal-martyn.com/ (Wheal Martyn Clay Country Park)

http://www.bbc.co.uk/news/uk-england-cornwall-22357712 (BBC News article - offshore tin extraction)

http://www.geevor.com/ (Geevor Tin Mine Museum)

1.2.2.2 Character Type: Energy Industry

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Energy Industry Character Type covers areas whose dominant character is concerned with the extraction, processing and/or storage of hydrocarbons (oil, oil derivatives, and gas, but not coal); installations relating to all forms of renewable energy generation, by wind, wave or tide, and power stations of all fuels, together with their associated transmission facilities and directly associated transport facilities.

Hydrocarbon resources in the region are limited and while coal has been quarried since the medieval period in the Forest of Dean, Bristol, South Gloucestershire, and North Somerset, and to a lesser extent in North Devon, the paucity of the resource has not led to industrial extraction on the scale of more northerly coalfields (Bone and Dawson 2008, 234).

The Kimmeridge Shales of Dorset provide the only oilfield in the region and are home to the largest onshore oil field in Europe at Wytch Farm (BBC News website), on the southern edge of Poole Harbour. Various oil storage and distribution facilities can be found at the larger ports of the region (Bone and Dawson 2008, 235).

The energy production industry in the South West is dominated by two nuclear power stations but, increasingly, renewable sources such as wind and solar power are coming online, especially in Cornwall. There are few fossil fuel power stations in the region, other than the new gas power plant at Langage, Plympton (see below).

Nuclear power stations were located at Hinckley Point, Somerset, Oldbury in South Gloucestershire and Berkeley, Gloucestershire. Hinckley Point is to host a new power plant under plans announced in 2013, the plant is scheduled to be completed in 2023 and remain operational for 60 years. Oldbury ceased generation in 2012 and Berkeley, the UK's first commercial station, was closed down in 1989 (Bone and Dawson 2008, 242).

The UK's first commercial onshore wind farm, at Delabole, Cornwall, opened in 1991. Since then a number of onshore wind farms have opened throughout the region, the majority inland from the North Devon and Cornwall coasts, but recently and notably, also at Avonmouth, the Bristol Port wind farm, consisting of three turbines that provide enough electricity to power half of the port over the year (Ecotricity website). Two more wind farms in the region have been approved, at Alveston, South Gloucestershire and at Black Ditch between the Huntspill and the Parrett in Somerset.

There are no offshore wind farms in the region and the proposed 250 turbine Atlantic Array wind farm lying between North Devon and South Wales has recently been dropped by the developer. A similar scheme, run by Eneco, is under consideration off the coast of Dorset.

The new South West Wave Hub, providing four berths for experimental wave energy projects and a link to the National Grid on the mainland has recently been installed off

the North Cornish coast at Hayle. The device will allow different developers the opportunity to trial their devices for a period of five years (South West RDA website).

Plans for the construction of a barrage across the mouth of the Severn are currently in limbo as the Government has announced that it will not commit public funds to the largest of four proposed schemes, a ten mile barrage including road and rail links between Weston-Super-Mare and Cardiff that could produce 5% of the country's electricity. Three other smaller schemes are still under consideration and further feasibility studies are planned (Guardian website).

Coal-fired power stations, situated coastally to take advantage of, often purpose-built, shipping facilities, have largely been decommissioned in the region such as those at Yelland on the Torridge Estuary, Poole (Bone and Dawson 2008, 242), and Hayle (Camidge *et al* 2006). The latter has now become host to the onshore link to the South West Wave Hub.

A new gas-powered power station at Langage, Plympton, supplies 1010Mw of power into the National Grid (Centrica website). Portland Gas applied to excavate 14 caverns in deposits of Triassic rock salt 2.4km below the surface on the Isle of Portland in order to store 1 billion cubic metres of gas, 1% of the total annual demand of the UK. The complex was due to open in 2013 but has been put on hold due to current economic conditions (Portland Gas storage project web page – Penspen; Engineer Live website – UK Gas storage article).

Historically, renewable energy installations include tidal mills which trapped sea water at high tide in large pools, and then utilising it to provide power to water wheels to drive machinery, often for the milling of grain and from the 19th century onwards for bone mills and other industrial production. These are often located upstream in the estuaries of the Fal, Tamar, Dart and Camel close to centres of population, industry and large estates.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The exploitation of oil in the region has focussed on the Kimmeridge Shales of Dorset. Oil-bearing shale was quarried and mined in the late 19th century at Clavell's Hard by the Kimmeridge Oil and Carbon Company. There were reported to be 5000 feet of underground levels in 1890 and the complex was connected to the company's factory at Wareham by tramway (Petroleum geology of the south of England website). Less successful attempts were made to extract oil from shale elsewhere as at Kilve on the Somerset coast where a retort dating to the 1920s can still be seen (Bone and Dawson 2008, 235).

The discovery of oil at Kimmeridge led to the development of England's first commercial onshore oil well in 1959 by BP. It still pumps oil at a rate of 100 barrels a day from the Cornbrash, a layer of rock 500m below the surface (Purbeck Mineral and Mining Museum website). The oil is transported by road tanker to Europe's largest oil field, at Wytch Farm, overlooking Poole Harbour, from whence a pipeline delivers it to Southampton. Oil is raised to the surface using the 'nodding donkeys' characteristic of onshore oil exploitation.

The history of the commercial production of nuclear power began at Berkeley in 1956 when construction started on one of two Magnox reactors. The plant was commissioned in 1962 and at full output could supply the electricity demands of a city the size of Bristol, 276MW. The reactors were decommissioned in 1988 and 1989 and since then all nuclear fuel has been removed from the site, and the turbine hall and cooling ponds have been demolished. The nuclear reactor structures must now be maintained until they can be safely demolished and the site completely cleared (Wikipedia).

Hinkley Point also housed two reactors: a Magnox reactor (Hinkley Point A), the construction of which began in 1957, but which, due to teething problems, did not begin generation until 1965; and an Advanced Gas-cooled Reactor (Hinkley Point B), started in 1967 but, again due to initial operational problems, did not begin generation

until 1976. Hinkley Point A ceased generation in 2000 whilst Hinkley Point B, despite operating at reduced capacity due to defects found in other similar reactors, is due to continue until 2016. A new European Pressurized Reactor, Hinkley Point C, is planned for the site (Wikipedia).

Oldbury nuclear power station, powered by two Magnox reactors, opened in 1967 with a designed power output of 600MW ceased generation in 2012 and plans to build a new power plant on the site as part of a new generation of nuclear power generation were shelved (Wikipedia).

Fig 12 Hinkley Point power station, Somerset (© Copyright Robin Somes and licensed for reuse under this Creative Commons Licence.)

The former use of small regional coal-fuelled power stations has left a mixed legacy of historical remains. At some sites, such as at Hayle in Cornwall, the closure of the site has been followed by the complete removal of almost all associated early remains, in this case following an agreement made at the time of construction (Hayle history website), although later supply points and substations survive (Camidge *et al* 2006, 76). Many of the sites, such as those at Yelland and Hayle, have been used subsequently as electricity substations. The power stations benefitted their local communities not only in terms of power provision (in the days before the National Grid) and employment but also in unforeseen ways such as the creation of a raised playing field on land at Turlin Moor that had been used to dump huge quantities of waste ash from Hamworthy Power Station in the 1950s (Hamworthy Matters website).

Typical historical components of this Type include: oil and gas fields. slag heaps and offshore spoil dumping grounds, sub-sea wells and wellheads, fixed platforms and drilling rigs, large, sprawling industrial complexes, cooling towers, chimney, distribution depots and customer service centres, and associated transport systems (such as railways, roads, ships, docks and tanker terminals). It is important to note that transport links are covered by the relevant 'Transport' Sub-types.

Components of historic tidal mills survive as ruined buildings and dams or occasionally, converted mill buildings, with many tidal pools now surviving as landscape features, for example, Mill Pool, West Looe, Cornwall.

VALUES AND PERCEPTIONS

There appears to be a general acceptance of the exploitation of the Dorset oil fields by the local population since the company involved at Wytch Farm, BP, has planted woodland and created large earth bunds to prevent contamination of surrounding land in the event of a spill (BBC News website). The wellheads are small and relatively unobtrusive, and given their longevity, are likely to have become an accepted part of the landscape.

The nuclear industry has suffered from a negative association with nuclear weapons and also from concern over operational safety and the disposal of spent nuclear waste. In more recent years the potential for damage inflicted through a terrorist attack has caused concern amongst many. Countering this opposition has been the greater awareness of the potential for global warming caused by humanity's release of carbon dioxide and other greenhouse gasses, a large proportion of which have been generated by fossil fuel-powered electricity generation. Some environmental scientists, in particular James Lovelock, have argued that nuclear fission is the best short term fix to the problem of carbon dioxide emissions from electricity generation (Lovelock 2006, 104). The last Labour government approved the construction of ten new nuclear power plants, the majority at established nuclear sites such as Hinckley Point and Oldbury (BBC News website), and the present government appears to be proceeding with the plans for Hinckley Point.

Many people are opposed to land-based wind farms on the grounds of visual impact and this has, in part, led to an enthusiasm for offshore generation. However, offshore wind farms can also threaten the livelihood of fishermen, who claim that it will prevent them operating in some of their most productive fisheries. Fears about the impact upon other wildlife and the wider environment have also been raised.

RESEARCH, AMENITY AND EDUCATION

Due to the relatively recent development of this character type very little research has been undertaken into the historical development of the industry.

An outstanding example of amenity and education can be found at Christchurch where the old Edwardian Power Station has been turned into the Museum of Electricity, opened in 1981, which includes examples of local electricity generating and distribution equipment as well as displays on the early history of electrical discoveries and collections of domestic appliances (Scottish and Southern Energy website, 2011).

Nuclear power stations often have a negative image for many people. The visitor centres at Hinkley Point and Oldbury have both closed recently, with Oldbury hoping to fill the gap with photographs of the plant on its website (Magnox North website) but there is little information regarding the history and operation of the plant.

A visitor centre operated at the UK's first commercial wind farm at Delabole but the Gaia Centre was forced to close in 2004 as a result of poor visitor numbers. There is no current resource covering the development of the industry in the region.

Fig 13 Aerial view of Hayle Power Station *c*1950. (Courtesy of Penlee House Gallery and Museum.)

CONDITION AND FORCES FOR CHANGE

There may be an expansion of the oil field at Kimmeridge since new reserves of oil have recently been discovered. Although the rate of production is slow the reserves are large and new developments coupled with the high price of oil have made onshore oil production more attractive (BBC News website). Expansion of the production may well require additional infrastructure.

Expansion of the renewable energy industry is inevitable given current concerns over carbon dioxide emissions and security of energy supplies. The immediate future for the region is likely to see the construction of a large offshore wind farm in the Bristol Channel and the start up of the wave hub off the north Cornish coast. Less certain are plans for the proposed Severn Barrage, with government committing to funding feasibility studies for three smaller projects, whilst abandoning a larger scheme. Onshore wind farms are likely to increase in number although local opposition groups may stall their progress through the planning system and in some case cause them to be abandoned. The replacement of earlier turbines with larger structures as they become obsolete has begun as has happened, for instance, at Goonhilly on the Lizard, where the initial 14 turbines installed in 1993 have been replaced with six which stand at over twice the height of the originals (BBC News website). The increase in size of new turbines may fuel further protests.

Proposals for the new nuclear plants at Hinkley Point will inevitably impact on the historical landscapes/seascapes since the ground previously occupied by decommissioned reactors will be unavailable for new development for many years. New infrastructure being considered for the construction of Hinkley Point C includes a northern bypass for Bridgwater and a Cannington bypass. There is expected to be a heavier volume of heavy loads using Combwich Quay (British Energy website).

RARITY AND VULNERABILITY

The majority of coal-fired power stations have been decommissioned and demolished, leaving few material traces. Infrastructure associated with the stations may survive, as with the jetty at Yelland, North Devon, formerly used to unload coal from barges. There are some survivals of generating buildings, as with the Edwardian station on the canal basin at Haven Banks, Exeter, which is to be preserved as a hotel and housing (Exeter

Memories website). The Edwardian power station at Christchurch has become an Electrical Museum operated by Scottish and Southern Power and retains many period features (Scottish and Southern Energy website).

The long period of decommissioning required for nuclear power plants ensures that the remains are still with us but an important role of the process is the removal of most of the power generating equipment. Much of the national focus on the history of the industry is on Calder Hall in Cumbria and there is little or no effort regionally to preserve or record the industry.

Renewable energy is too new to have attracted any interest in recording the development of the industry, or the preservation of obsolete structures. Replacement of obsolete equipment is done wholesale and leaves little or no trace of previous structures.

PUBLISHED SOURCES

Bone, M, and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in C J, Webster, ed, 2008, *The Archaeology of South West England, South West Archaeological Research Framework: Resource Assessment and Research Agenda*, Taunton: Somerset County Council, 213-68

Camidge, C, Johns, C, Rees, P, Tapper, B, 2006. *South West Wave Hub, Hayle, Cornwall, Archaeological Assessment*, Truro: Cornwall County Council

Lovelock, J, 2006. *The revenge of Gaia*, London: Allen Lane

WEBSITES

http://news.bbc.co.uk/today/hi/today/newsid_8743000/8743427.stm (BBC News - Wytch Farm oil field)

http://www.penspen.com/Projects/Pages/50088D-EW.aspx (Portland Gas Storage project)

http://www.engineerlive.com/content/21941 (Engineer Live news article – UK oil and gas storage)

http://news.bbc.co.uk/1/hi/8349715.stm (BBC News - Nuclear power)

http://www.ecotricity.co.uk/wind-parks/ (Ecotricity)

http://www.bbc.co.uk/news/10414567 (BBC News - Atlantic Array)

http://www.thisiswesternmorningnews.co.uk/news/Fishermen-fear-loss-grounds-wind-farm/article-1833581-detail/article.html (Western Morning News)

http://www.thecrownestate.co.uk/media/214799/round3_connection_study.pdf (The Crown Estate Round 3 Offshore Wind Farm Connection Study)

http://www.centrica.co.uk/files/reports/2006cr/index.asp?pageid=69 (Centrica)

http://webarchive.nationalarchives.gov.uk/20130714121526/http://www.wavehub.co.uk/ (former South West RDA)

http://www.soton.ac.uk/~imw/Oil-South-of-England.htm (Petroleum geology of the south of England)

http://www.pmmmg.org/Oil.htm (The Purbeck Mineral and Mining Museum)

http://en.wikipedia.org/wiki/Kimmeridge (Wikipedia - Kimmeridge)

http://en.wikipedia.org/wiki/Berkeley_nuclear_power_station (Wikipedia - Berkeley)

http://en.wikipedia.org/wiki/Hinkley_Point_C_nuclear_power_station

(Wikipedia - Hinkley Point)

http://en.wikipedia.org/wiki/Oldbury_Nuclear_Power_Station (Wikipedia - Oldbury)

http://freepages.genealogy.rootsweb.ancestry.com/~phillack/history.htm (Hayle history)

http://www.aboutmyarea.co.uk/Dorset/Poole/BH15/Community-Hubbubs/Hamworthy-Matters/112799-Turlin-Moor%22 (Hamworthy Matters)

http://www.guardian.co.uk/environment/2010/sep/05/severn-green-energy-project-loses-funding (Guardian newspaper)

http://news.bbc.co.uk/local/cornwall/hi/people_and_places/newsid_8900000/8900560.stm (BBC News - Goonhilly wind turbine renewal)

http://www.exetermemories.co.uk/em/electricitystation.php (Exeter Memories)

http://www.scottish-southern.co.uk/museum/pages/aboutus.asp (Scottish and Southern Energy, 2011)

http://www.british-energy.co.uk/ (British Energy)

http://www.magnoxnorthsites.com/oldbury (Magnox North)

http://en.wikipedia.org/wiki/Isle_of_Portland#Geology (Wikipedia Isle of Portland)

1.2.2.3 Character Type: Processing Industry

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Processing Industry Character Type covers a broad range of processing and production industries which have a particular relevance for HSC due to their distinctively coastal and/or maritime expression and occurrence.

This Character Type is directly related to the processes of production and manufacture and, indirectly, to the consumption of goods. It includes many sub-types that are absent, or almost absent, from the South West, such as chemical works. Iron and steel works were formerly present throughout much of the region but, with a few exceptions, were often small and local.

Many of the region's historical processing industries will fall into the Industrial production (unspecified) sub-type such as wool processing and pottery, brick and tile production. In the Tamar valley, for example, Westdale's brick, tile and fired clay works at Rumleigh, Belswood and Calstock used the river to ship their products off to the wider world including St Petersburg.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Processing industries have formed a significant part of the history and character of the South West since the Roman period, for example iron production in the Forest of Dean, for which a great deal of evidence has been found in the intertidal zone of the Severn Estuary in the form of slags (Fulford and Allen 1992). In the medieval period the iron was extracted and smelted on site to produce bars for working elsewhere. The number of ironworkers was so large that complaints were frequently made concerning the widespread destruction left in their wake (Birrell 1980). Henry Powle, writing in the mid 17th century, describes the whole process from mining to forging, all of which appears to have taken place in the same location (Powle 1677-8).

Iron and steel were processed throughout the region from the 18th century and sites include significant centres such as Perran Foundry and Harvey's Hayle Works in Cornwall (Bone and Dawson 2008, 236), producing equipment and steam engines, primarily for use in the mining industry. The stimulus from Harveys and the Cornwall Copper Company (CCC) at Hayle prompted the massive early 19th century development of Hayle harbour as we see it today. Harvey's ability to ship its pumping engines from those docks led to it becoming an international leader in that trade, earning fame by supplying the pumping engines which drained much of the huge area of the Dutch Ijsselmeer.

Smaller foundries have been identified in regional centres such as Exeter and Taunton (Bone and Dawson 2008, 236). The Bristol Iron Works once produced railway locomotives for the Great Western Railway and was once described, in 1840, as the largest iron works in Europe. The site was taken over by the John Lysaght Galavanising Works, the largest in the world at one time, which galvanised corrugated iron and shipped it around the world to the colonies (Floating Harbour website).

Chemical works in the region are largely confined to Bristol with examples of historical works including the Netham Chemical Works which produced caustic soda and ammonia (Floating Harbour website) and various gunpowder production sites. The latter industry was originally based in the city but as demand grew in the 18th century production moved to rural water-powered sites.

Fig 14 Kennall Vale gunpowder works, Cornwall. (Photograph; Cornwall Council)

Gunpowder remained an important trading commodity and was particularly linked to the slave trade centred on Bristol (Buchanan 2000). Other important gunpowder manufacturing sites were located in Cornwall, as a consequence of demand by the mining and quarrying industries. Kennall Vale is a well-preserved 19th century works on the River Fal (Cornish Mining website) whilst the National Explosives Company based at Hayle Towans produced dynamite from 1888, including large amounts of naval ordnance during World War 1 (Flying Past website).

Timber yards and carpenter's, joiner's, and wheelwright's shops were once widespread throughout the region but a reliance on imported timber in recent years has largely destroyed the industry (Bone and Dawson 2008, 236). A notable exception is the Shapland and Petter works in Barnstaple, built on the site of an old shipyard in 1888. The company was founded on the use of wave-moulding machines following a glimpse of such a machine obtained by Henry Shapland on a trip to America in 1848. Initially the company focussed on cabinet making but diversification following the First World War included contracts for the fitting out of Pullman carriages and ocean liners. Timber was imported by sea and by rail (Arts and Crafts website).

A large variety of other industries prospered in the South West, often, but not always, centred on Bristol. Woolmaking, using imported dyes from South America, soapmaking, using Mediterranean olive oil, sugar refining, tobacco processing, and glass manufacture were all important industries from the 17th century, relying heavily on the

import of raw materials and the export of finished goods (Aughton 2000, 78-82). The traders of Bristol were said to have 'a more entire interdependency upon London, than any other town in Britain' being, after London, 'the greatest, richest and best port of trade in Great Britain' (Defoe 1727). Other parts of the South West, notably Bridgwater and Nailsea, were important centres for glass production (Bone and Dawson 2008, 236).

The production of pottery from local clays has been a feature of the region since prehistory. Gabbroic clays from a localised area of the Lizard peninsula (Harrad 2004) were used from the Neolithic period up to the 13th century AD (Rippon and Croft 2008, 203) to manufacture pottery vessels, many of which, particularly during the Neolithic and Bronze Age, were traded over considerable distances along the south coast of England. There is also evidence that the clays themselves were transported and later mixed with local clays for pottery production (Quinnell in Jones and Taylor 2010, 108-9). During the Iron Age and Roman periods, there was a considerable industry in the Poole Harbour area manufacturing South West Decorated Wares and, later, Black-burnished Wares. Recent evidence of stone jetties dating to the Iron Age uncovered in the harbour suggests a trading centre engaged in the export of these wares, found across much of the South West, along with items such as Kimmeridge shale artefacts and probably salt (BBC News website).

Pottery continued to be made in the region throughout the medieval and early post medieval periods with important centres in Somerset, Lostwithiel, and Barnstaple (Rippon and Croft 2008, 203). Brickworks became widespread throughout the region from the later 18th century as bricks began to replace stone and cob as a major source of building material. These were often sited near to the sources of clay or, with a shorter lifespan, close to the point of construction. The production of clay roof tiles was once important in Somerset but has now vanished (Bone and Dawson 2008, 236).

Leather and other textiles have been produced throughout the region and in the second half of the 19th century a large industry emerged around Bristol and Somerset engaged in shoe manufacture, glovemaking, and shirt and collar manufacture (Bone and Dawson 2008, 236).

There is little information regarding the extent of cement works in the region. A cement and lime works was based in the Somerset village of Dunball, at the western end of the Polden Hills on the banks of the Parrett. A coastal trade in cement developed from this. Other known sites of cement works include Plymstock, Kilmington, and Bridgwater. The works are generally on the site of limestone or chalk quarries.

The production of lime for mortar and plaster in England goes back to the Roman Saltmaking has previously been a major industry in the region, with origins in the Bronze Age. The use of salt offered a means of preserving food, in particular fish and meat, and one of the sources of salt is seawater. Coastal evidence for early salt production, dating back in Somerset to the Middle Bronze Age, comprises finds of coarse pottery (briquetage) from boiling vessels, trays and pedestals, often accompanied by hearth debris. Evidence in the form of briquetage has been found at Brean Down from a layer dated to 1780-1420 cal BC (HAR-7020) (Bell 1990). By the later Iron Age and Roman periods salt production leaves some extensive surviving landscape features, notably the debris mounds known as salterns in Somerset (Rippon 2008). Other production centres have been identified at Weston-Super-Mare and Lundy (Holbrook 2008, 156), Trebarveth (Peacock 1969) and Carngoon Bank (McAvoy 1980) on the Lizard peninsula, and the area around Poole Harbour (Holbrook 2008, 156).

Fig 15 Limekiln at Cotehele Quay on the River Tamar. (Photograph; Nigel Thomas.)

Salt production continued into the medieval period in the region and is known from Lyme Regis where Cynewulf, King of the West Saxons, granted some land on the west bank of the river Lyme to Sherborne Abbey, where a salt-distilling industry grew up (West 2008). The industry is also recorded in the Domesday Book at Seaton and Beer (Rippon and Croft 2008, 203), and in names such as Saltash and Budleigh Salterton (Hanks *et al* 2002).

The 1848 Public Health Act was the catalyst for change and model for the rest of the world to follow after the cholera epidemics of 1831, 1832 and 1847 made it clear that a clean water supply was essential. It made local authorities take charge of separating water supply from sewage disposal, lay down drains and sewers, make sure every house had some kind of sanitary arrangement, and connect all new homes to a water supply by the mid-1860s. By the 1870s, the death rate had fallen dramatically wherever a new sewerage system was built. More important still, the link between good sanitation and public health was firmly established, providing the driving force for modern water supply and sewage systems (Wikipedia).

Typical components of Processing Industry include: chemical works, iron and steel works, timber yards, brick, tile and clay works, potteries, glassworks, mills, lime kilns, cement works, roperies, warehouses, engine and boiler works, sewage treatment works, water treatment works, sewage pipelines, diffusers, outfalls, pumping stations, reservoirs, saltworks.

VALUES AND PERCEPTIONS

Generally this Character Type is perceived as industrial and, in its modern forms, has often been seen by many as unpleasant and dirty. Perceptions of our industrial heritage have seen much change in recent decades though and the historical components of the Type have attracted interest in their own rights and there are increasing pressures for information on and conservation of facilities such as lime kilns and brick works.

The need for adequate sewage provision is generally accepted but the manner new schemes are sometimes controversial for aesthetic, environmental and heritage reasons.

RESEARCH, AMENITY AND EDUCATION

Processing areas have plenty of potential for undertaking historical and archaeological research. Some features, such as mills and limekilns may be suitable for presentation – amenity value. For example, the bid process for the Cornwall and West Devon Mining World Heritage Site generated a large amount of knowledge concerning the processes associated with the mining industry, including the manufacture of gunpowder.

Research into the history of reservoirs may throw light on the methods of selection of sites. Archaeological information can be gleaned from their shorelines and, with more sophisticated planning constraints, there will be greater opportunities to undertake detailed recording in advance of any future reservoirs. Although not directly related to the historical landscape, the amenity potential of reservoirs is great, not only for fishing and water sports but also as wildlife havens and a dramatic contributor to landscape character.

Many of the surviving production areas also play a key role in understanding the development of the industry and should be understood in conjunction with the Extractive Industry Character Type.

CONDITION AND FORCES FOR CHANGE

Condition is extremely variable since some sites have been almost entirely destroyed, and others are virtually intact with most features still in place. Some of the components of these industries are well preserved, lime kilns and mills for example. However, many post-industrial landscapes are neglected and there is increasing pressure for redevelopment of former industrial areas.

Many locally-based industries have declined as networks of manufacture and supply have grown in scale and become increasingly centralised in the 20th century.

RARITY AND VULNERABILITY

Some processing areas may be nationally or regionally rare. Many locally-based industries have declined as networks of manufacture and supply have grown in scale and become increasingly centralised in the 20th century.

Continually rising awareness of the value and importance of industrial remains will make them increasingly less vulnerable. Some receive protection through being Scheduled Monuments or Listed Buildings, other sites fall within designated areas, especially Areas of Natural Beauty (AONBs) and Areas of Great Landscape Value (AGLVs). In Cornwall the World Heritage Site may not be a statutory designation, but the status it confers means that moves to disturb industrial remains will generally be resisted.

PUBLISHED SOURCES

Aughton, P, 2000. *Bristol: a people's history*, Wilts: The Cromwell Press

Bell, M, 1990. Brean Down excavations 1983-1987, *English Heritage Archaeological Report* **15**, London: Historic Buildings and Monuments Commission for England

Birrell, J R, 1980. The Medieval English Forest, *Journal of Forest History* **24**, **2**, 78-85

Bone, M, and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in Webster, ed, 2008, 213-68

Buchanan, B J, 2000. The Africa Trade and the Bristol Gunpowder Industry (pp. 133-56), *Transactions of the Bristol & Gloucestershire Archaeological Society* **118**, 133-56

Defoe, D, 1727. *A tour thro' the whole island of Great Britain, divided into circuits or* journies, London: JM Dent and Co, (1927)

Friel, I, 2003. *Maritime History of Britain and Ireland c.400 – 2001*, London: British Museum Press

Fulford, M G, and Allen, J R L, 1992. Iron-Making at the Chesters Villa, Woolaston, Gloucestershire: Survey and Excavation, *Britannia* **XXIII**, 159-215

Hanks, P, Hodges, F, Mills, A D, and Room, A, 2002. *The Oxford Names Companion*, Oxford: Oxford University Press

Harrad, L, 2004. Gabbroic clay sources in Cornwall: a petrographic study of prehistoric pottery and clay samples, *Oxford Journal Of Archaeology* **23** (3), 271–286

Holbrook, N, ed, 2008. Roman in Webster, ed, 2008, 151-62

Isham, K, 2000. *Limekilns and limeburners in Cornwall*, St Austell: Cornish Hillside Publication

Jones, A M, and Taylor, S R, 2010. Scarcewater, Pennance, Cornwall – Archaeological excavation of a Bronze Age and Roman landscape, *BAR British Series* **516**

McAvoy, F, 1980. The excavation of a multi-period site at Carngoon Bank, Lizard, Cornwall, 1979, *Cornish Archaeology* **19**, 31-62

Peacock, D P S, 1969. A Romano-British Salt-working site at Trebarveth, St Keverne, *Cornish Archaeology* **8**, 47-65

Powle, H, 1677-8. An Account of Iron-Works in the Forest of Dean, Communicated by Henry Powle, Esquire, *Philosophical Transactions (1665-1678)* **12** (1677 - 1678), 931-935

Rippon, S, 2008. Coastal Trade in Roman Britain: the Investigation of Crandon Bridge, Somerset, a Romano-British Transshipment Port beside the Severn Estuary, *Britannia* **XXXIX**, 85-144

Rippon, S and Croft, B, eds, 2008. Post-Conquest Medieval, in Webster, ed, 2008, 195-208

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework Resource Assessment and Research Agenda*, Taunton: Somerset County Council

West, I, 2008. *Lyme Regis, Dorset, the Town and Seafront: Geology of the Wessex Coast*. Internet geological field guide. School of Ocean and Earth Science, National Oceanography Centre, Southampton University

WEBSITES

http://news.bbc.co.uk/1/hi/england/2266789.stm (BBC News - Iron Age port in Poole Harbour)

http://en.wikipedia.org/wiki/Public_Health_Act_1848 (Wikipedia - Public Health Act 1848)

http://www.bristolfloatingharbour.org.uk/harbour-trails/heritage-trails/feeder-canal-and-river-avon/ (Bristol Floating Harbour)

http://www.cornish-mining.org.uk/individual-audio-trails-kennall-vale (Kennall Vale)

http://www.historic-cornwall.org.uk/flyingpast/land.html (Flying Past - Hayle Towans explosives factory)

http://www.artscrafts.org.uk/branches/sandp/shapland.html (Arts and Crafts - Shapland and Petter)

http://en.wikipedia.org/wiki/Puriton (Wikipedia - Puriton)

http://www.southampton.ac.uk/~imw/Lyme-Regis-Seafront.htm (Lyme Regis, Dorset, the Town and Seafront: Geology of the Wessex Coast)

http://www.southwestwater.co.uk/index.cfm?articleid=4042 (South West Water)

1.2.2.4 Character Type: Shipping Industry

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type refers to areas dominated by activity relating directly to the non-recreational use, maintenance, storage and administration of shipping.

Transport by sea and river will have been the preferred mode of travel and trade until the coming of the railways in the 19th century. Prior to this overland transport, particularly in the far west, would be long and arduous compounded by the terrain, distance, and the lack of anything that could be termed a regionally-connected road network. In contrast, waterborne transport offered advantages of higher capacity, ease of movement, although there are relatively few safe harbours on the English side of the Bristol Channel compared with the sheltered estuaries of the south coast of the region.

Shipyards and boatyards were formerly widespread throughout the region with facilities at even the smallest coastal and estuarine settlements. However, the industry is now largely confined to repairs to larger vessels, with the exception of the military DML yards at Appledore and Devonport, and a reasonably substantial production of mostly leisure craft at smaller boat yards around the South West, at Wadebridge, Padstow, Polruan, Plymouth, and Dartmouth, amongst others.

Although the capacity for coastal trade reduced with the arrival of the railways and again with the construction of modern road links, international trade still relies on commercial shipping, mostly in the form of bulk carriers that operate from fewer, but mostly larger, ports. Avonmouth remains one of the largest container ports in the country with shipping routes to many parts of the world whilst Fowey is now the only Cornish port exporting china clay, mostly on routes to Northern Europe.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Evidence for prehistoric and early medieval vessels in the British Isles is sparse, due primarily to the perishable nature of the materials from which they were constructed. But it is probable that log boats (canoes made from hollowed out tree trunks) and skin boats were common, and were used in these periods, as ferries, fishing boats, trading vessels and even for war (Friel 2003, 22).

In the South West, log boats have been found at: Bigbury, Devon; Poole Harbour, Dorset; and Newlyn, Cornwall. The Bigbury boat is alleged to have been associated with Mesolithic artefacts (Hosfield *et al* 2008), whilst the other two are much later. The Poole boat dates to 295 BC (BBC News website). The Newlyn boat, unfortunately lost, was reputed to have had a Roman coin beneath the remains of a mast (Bell 1990). The remains of a larger ship is inferred from the discovery of what is thought to be a cargo of tin ingots at Bigbury, South Devon. Although no traces of the ship remain, it is thought to have plied a coastal trade, perhaps in the Roman or Post Roman period.

It is difficult to find evidence of established shipyards in medieval England. The location of shipbuilding sites seems to have been rather haphazard and the sites themselves were rudimentary, although it is known that ships were being built in simple docks by at least the 1330s. These were holes dug in the ground by a waterway, with the water kept out by an earthen dam. The ship was built inside. When completed, the dam was broken down and the ship was floated out at high tide.

Accounts from between the late 13th and early 15th centuries make it clear that shipbuilding was still based on clinker construction. Seagoing ships of any size in Britain were clinker-built until the late 15th or early 16th century. The ancient double-ended hull form was widespread until the 14th century, when vessels that were asymmetrical, with stems and sterns of different shape, gradually supplanted it. This change appears to have followed the introduction of the stern rudder, which first appeared in the 12th century and eventually supplanted the side or quarter rudder and, more importantly, was probably better suited to deep-hulled merchant ships.

As well as shipwright and smith craftsmen, a number of other kinds of worker were also involved in shipbuilding. 'These included clenchers and holders, and from the 1340s there were caulkers, who filled the gaps between planks with waterproofing materials. In earlier periods this job seems to have been done by shipwrights and it is not clear why a separate trade should have emerged. However it was to remain a part of the shipbuilding trade for as long as wooden sea-going vessels were built' (Friel 2003, 77-78).

'During the Viking era there is very little evidence for specific types of ships used in England. In some areas local wooden shipbuilding traditions may have been completely replaced by Scandinavian ones. As late as the 1290s the technical terminology used by shipwrights in Newcastle and York had a distinctively Scandinavian flavour when compared with that used in East Anglia or further south. The basic type of Viking ship had a clinker-built, double-ended hull with a deep keel. It was steered by a rudder and carried a single square sail' (Friel 2003, 45).

Changes in European shipping during the 15th century owed much to the influence of the skeleton-built Portuguese caravels. Skeleton construction involved nailing hull planks to a pre-erected skeleton of strong frames; the planks did not overlap, but were laid against each other, giving the hull a smooth exterior.

'Other 15th century shipping changes included the introduction of two- and three-masted ships and a sharp decline in the numbers of large ships. The latter may have been due to the cessation of the Gascon wine trade while the export of cloth, England's other main sea trade, only required small vessels. Merchant ships of more than 100 tons were not common again in England until the late 16th century, when they were constructed for long-distance bulk trade and for war' (Friel 2003, 80-82).

Shipbuilding was carried out throughout the region from the medieval period in many yards with important centres at Bristol, Appledore, Falmouth, Dartmouth, and Plymouth, although the latter's facilities were primarily, although not exclusively, for naval work.

Shipbuilding on the Severn was widespread. A shipwright recorded living in Frampton in 1572 may have worked at a boatyard at Frampton Pill that was still extant until the late 19th century. Ship- and boat-builders were recorded in 1608 in Awre and Lydney parishes and naval frigates were built at Cone Pill near Lydney until 1646 (Mullin *et al* 2009, 25-30).

Many ports in the region, even the smallest, had shipbuilding facilities from the medieval period. Cornwall's fishing industry was one of its most important in the later medieval period and facilities would have existed to construct the vessels required locally. Shipbuilding itself gradually increased in importance in this period (Preston-Jones and Rose 1986, 167). Falmouth, from an initial reliance on fishing and victualling, quickly became involved in shipbuilding from the 17th century. The Falmouth Docks were built in 1863 and shipbuilding continued until 1930, following which the docks have continued to be used for repairs. Records of shipbuilding on the Fal in the period 1786-1914 show that vessels were built at Budock, Calenick, Carnon Yard, Cowlands Creek, Devoran, Dock Head, Falmouth, Falmouth Bar, Feock, Flushing, Little Falmouth, Malpas, Mylor, Penryn, Pill, Point, Ponsharden, Restronguet, Roundwood, St Mawes, Sunny Corner, Trelew, Tresillian, and Truro. Vessels built ranged from 4 ton yawls to ships of over 400 tons (Ratcliffe 1997, 37-8, 177-96).

Fig 16 Construction of an Isles of Scilly Pilot Cutter at Gweek boat yard, Cornwall, in 2007 (© Bill Booth and licensed for reuse under this Creative Commons Licence.)

Recorded shipbuilding in the Isles of Scilly commenced in 1773 and lasted until 1878, and at its peak in the 1840s there was one yard on Bryher and four on St Mary's (two each on Town Beach and Porthcressa) employing almost 100 men and apprentices. The first vessel built locally was a 12-ton, 30ft long sloop, the *Happy Return***,** built by a Banfield who became prominent in the trade**,** the last a 170-ton, 101ft long brigantine named *Gleaner***.** Between those dates, 164 craft or vessels were built and launched (Johns *et al* 2004).

During the 19th century, shipbuilding became one of the most important industries at Hayle in Cornwall, with Harvey and Co. dominating the scene. They built both barques and brigantines, paddle wheel and screw steamers. At first, in the years following 1834, they produced wooden sailing vessels for their own use, with frames built of local oak and planking from pine, imported from Norway and Canada. Later they began to build composite ships with iron frames and wooden planking. Harvey's first outside commission came in 1846 with the building of steam-driven iron tugs for the Rhine. From the early 1860s to the late 1880s, Harveys produced a large number of moderately sized iron ships and then, until shipbuilding ceased in 1893, the great steel ships, such as the SS *Ramleh*. The Cornish Copper Company also produced a few complete ships as well as supplying engines for existing vessels. The *Riviere*, the *Penair* and the *Margaret* were three iron schooners built by the company the last two in 1861 and 1866 respectively. In the 1860s there was another shipbuilding yard in Hayle owned by John Pool, but only three sailing ships can be identified as having originated from there. After the closure of Harvey's yard and foundry, various attempts were made to resuscitate the shipbuilding industry. During WW1, Admiralty representatives visited Hayle to review the possibility of once again building ships on Harvey's premises. In the 1920s, machinery for barge and ship construction was installed but it was not until WW2 that shipbuilding recommenced at Hayle with the building of D-day landing craft and defence vessels (Phillack parish web page).

At Dartmouth there is evidence of early shipbuilding facilities in the terms of its Royal Charter, granted in 1341, which obliged the town to provide two ships a year to the king. In 1620 the *Mayflower* put into the port for repairs by local shipwrights to her sister ship the *Speedwell* (Dartmouth Archives website). However, it was the activities of an ambitious politician, John Seale, attempting to obtain favour with the Admiralty in

his attempt to win a parliamentary seat, which boosted shipbuilding in the town. A dry dock complex to equal any Plymouth could boast was built at Sandquay, completed in 1793. The facilities comprised a number of slips, a small wet dock, a dry dock served by a boiler house and a Newcomen steam engine, and associated offices and workshops. These docks were used primarily for naval work initially but another yard at Noss Point on the other side of the Dart was used to build commercial vessels around the same time. A number of other yards operated at Dartmouth during the 19th century, principally Philp and Son and, later, Simpson and Strickland. These companies switched from wooden vessels to steam-powered iron ships towards the end of the century (Smart 2001). Simpson and Strickland opened a large new facility at Noss in 1893 which catered for wooden and steel boats until the demise of the company by 1917. Philp and Son took over the yard the following year (Smart 2000). Shipbuilding at Dartmouth ended in the 1970s and although repairs are still carried out at Noss, the majority of the facilities have been converted to marinas and industrial units (Dartmouth Archives website).

Components of shipbuilding and shipping industry in England include docks; basins; wrecks; wharfs, quays, jetties and slipways; warehouses, offices, depots and travelling cranes; dockworkers' cottages; and specifically associated transport systems (such as railways, roads, tramways).

VALUES AND PERCEPTIONS

Ship and boat building has a long history in the South West and is considered a locally important and valuable industry with a rich heritage of engineering and technological innovation, particularly to those who have worked in it.

RESEARCH, AMENITY AND EDUCATION

This Character Type contains amenity value which is linked to recreational and leisure activities such as sailing. Other amenity and educational values are reflected in the range of maritime-related museums and historic shipyards (e.g. National Maritime Museum, Falmouth). In addition the study of ship building, associated infrastructure, and wreck sites offers a wealth of cross-curricular opportunities incorporating science, maths, English, history and environmental studies.

Documentation of the shipbuilding industry in this area is relatively good, with many surviving historic maps, charts and photographs and numerous publications and TV documentaries having been produced on the industry. Further study of this industry is urgently required and this abundance of information will help inform it.

CONDITION AND FORCES FOR CHANGE

Both ship-building and commercial shipping in England have become greatly centralised since the late 19th century, withdrawing from many of their localised expressions. Its components, however, remain distinctive features at many locations and have now been transformed into marinas or commercial centres, such as the Floating Harbour at Bristol, Portishead, Watchet, various areas of the Fal Estuary and Plymouth Sound, and Dartmouth.

Today, the shipping industry can be seen as an expanding global business. This potential growth offers significant inward investment opportunities as well as wider economic benefits for the region.

RARITY AND VULNERABILITY

The components of this Character Type are widespread throughout the region and contribute strongly to local and regional cultural character.

The vulnerability of this Character Type is exemplified by historic shipbuilding areas that have been transformed into marinas or commercial centres.

PUBLISHED SOURCES

Bell, D, 1990. Cornwall in Coles, B J, ed, 1990, 5-18. *Organic archaeological remains in southwest Britain*, Exeter: WARP Occasional Paper **4**

Friel I, 2003. *Maritime History of Britain and Ireland*, London: The British Museum Press

Johns, C, Larn, R, and Tapper, B, 2004. *Rapid Coastal Zone Assessment for the isles of Scilly*, Truro: Historic Environment Service, Cornwall County Council

Mullin, D, Brunning, R, and Chadwick, A, 2009. *Severn Estuary Rapid Coastal Zone Assessment Survey, Phase 1 report*, English Heritage

Preston-Jones, A, and Rose, P, 1986. Medieval Cornwall, *Cornish Archaeology* **25**, 135-85

Smart, I H, 2000. Dartmouth Harbour Papers Pt.5, The history of the Noss Shipyard in the 19th Century, *Maritime South West* **13**

Smart, I H, 2001. Dartmouth Harbour Papers Pt.6, The Shipyards of Dartmouth, Sandquay Dockyard, *Maritime South West* **14**

Worcestre, W, *Itineraries*, ed. John Harvey, Oxford: Clarendon Press, 1969

WEBSITES

http://news.bbc.co.uk/local/dorset/hi/people_and_places/history/newsid_8465000/8465115.stm (BBC News - Poole log boat)

http://www.bbc.co.uk/news/uk-wales-11507416 (BBC News - Newport ship)

http://freepages.genealogy.rootsweb.ancestry.com/~phillack/shipbldg_wrecks.htm (Shipbuilding, Phillack parish - including Hayle)

http://www.dartmouth-history.org.uk/dartmouth/main.asp (The Dartmouth Archives - A brief history of Dartmouth)

1.2.3 Broad Character: Fishing

1.2.3.1 Character Type: Fishing

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The 'Fishing' Character Type refers to areas of the sea, estuaries and rivers whose character is dominated by activities concerned with the capture or gathering of wild fish and unfarmed shellfish stocks by various methods such as trawling, netting, trapping, potting, dredging and collection by hand. This includes directly associated landing, marketing, processing and distribution facilities

Sea fishing is both an ancient and unique activity. Though defying classification either as industry, agriculture or transport, it exhibits characteristics of all three (Starkey *et al* 2000; 9). Historically, of the huge variety of fish populating south-western seas, two species – herring and pilchards – figured heavily. In the south west fishing can be divided into two categories- those techniques using mobile gears and those using static. The former include trawls and seine nets dragged across the sea floor or through the water column while the latter include fixed nets and lines, and pots and traps placed on the sea floor.

Historically most fishing activity occurred a short distance from the coast and was primarily to meet subsistence needs (Starkey *et al* 2000, 23). Fishermen distinguished between inshore and offshore local fisheries and those fished at a greater distance offshore. The former – generally within a day, but sometimes three or four, were referred to as 'near' or 'home' voyages conducted by an inshore fleet while the latter were referred to as 'long' or 'far' voyages to 'the deeps' conducted by coastal and offshore fleets (Starkey *et al* 2000, 85). Today these historical precedents are reflected in the UK by the limits of fishing access rights. From the mean low water mark out to 6

nautical miles British fishing vessels have sole access rights. Between 6 and 12 nautical miles other EU countries' vessels with historic rights have access, but beyond 12 nautical miles access is open to vessels from any other EU country which has quota to fish the area.

Differences in patterns of fishing are often determined by the nature of the 'ground' (the seafloor and seabed) described by fishermen operating various types of gear, dredgers and trawlers often being bound by sedimentology and netters by bathymetry, for example, deeper channels where shoaling fish can be targeted (des Clers *et al* 2008 30).

The West Country fisheries have, for much of their history, largely been domestic and relatively small-scale yet widely dispersed. This is reflected in the scale of the traditional fishing activities and comparative lack of industrial scale ship-building, although the South Devon trawling ports of the mid-late 19th century came to dominate the national fleet. Cornish fishing differed markedly from that practised further east in Devon, Dorset and Somerset. It followed a pattern of pre-industrial methods and techniques right up until the 20th century (Wheatley 2000).

Historically there have been few large harbours, excepting Bristol, Barnstaple, Falmouth, Plymouth and Dartmouth which had room and depth for larger vessels. In practice however many coves and beaches supported a number of small vessels. Generally craft were light, shallow-drafted and fast, as epitomised by the Cornish lugger, able to access the hundreds of fishing villages dotting the indented coastline. Today Newlyn, Plymouth, Brixham and Poole are the main fishing ports.

The Severn Estuary and Severn River have historically been important because of the presence of the migratory fish species: salmon, sea and river lamprey along with elvers which have formed the basis for many fishing activities, particularly 'fixed engines' such as weirs, baskets and nets.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Without doubt fishing has been an integral part of human activity since prehistory. During the Middle Ages fish contributed significantly to the medieval diet with rivers and estuarine or inshore fishing being the most important sources. In the south-west the importance of fishing and the growth of the industry was reflected by the development, from the 15th century onwards, of temporary inshore fishing 'cellar settlements' to permanent fishing villages (Serjeantson and Woolgar 2006, Starkey *et al* 2000).

The sea fisheries were extensive, diverse and contributed significantly to the economies of many ports and coastal communities and the sale of fish was one of the most regulated trades in medieval England and Wales. The variety and abundance of species in the Western fisheries meant they could be exploited across a greater part of the year than those off eastern England which were largely restricted to the annual migration of herring (Starkey *et a*l 2000, 19, 23).

Although most medieval inshore fishing was primarily to meet subsistence needs some manorial/seigniorial controlled ventures (e.g. sea-weirs at Minehead) indicate their potential commercial value. At a regional level inshore fishing on the north coast of Devon and Somerset was not as bountiful as in Cornwall or south Devon, whilst Bristol was too far up the Avon to be home to many fishermen despite serving as the region's major fish market (Starkey *et al* 2000, 23, 26).

Fig 17 Recording an intertidal fishing weir © Archaeology Service, Gloucestershire County Council. (Photograph taken during survey as part of the EH funded Severn Estuary RCZAS)

A wide variety of fishing techniques were employed inshore. Fish traps have been identified in the many estuaries and intertidal areas, usually made of wood and stone, and are one of the oldest methods of fishing. The usual types are individual traps, fixed arrays of traps set in weirs, and fixed nets staked in position. Some constructions were permanent whilst others were seasonal and thus temporary.

Usually weirs were constructed in such a way as to completely stop the mouth of narrow tidal creeks such as the traps found on Stert Flats in Bridgewater Bay and the fish weirs along the course of the Parrett (1831 chart – H.485, shelf Qe in UKHO). On the ebb tide, water would run off, leaving fish stranded behind the barrier of stone or wood/wattle or caught in baskets set in series. Some of the earliest traps are individual v-shaped contraptions that have been dated, by dendrochronology, to the 10th century (Brunning 2007). Some areas have considerable antiquity in the historic use of fish traps and weirs. At Tidenham, Gloucestershire 56 basket weirs were noted in the Domesday Book and 1100 were in use in 1866 (Dellino-Musgrave and Ransley 2013).

Sea weirs were especially common along coasts of northern Somerset and Wales and included the massive weirs at Minehead, Dunster and Goldcliff (Brunning 2007). These comprised low underwater stone walls into which wooden stakes were set and connected by screens of woven branches and twigs. The walls averaged 150m in length but could be as long as 400m and were built in parallel lines, converging to form an angle that faced the sea, across this neck nets were stretched to trap fish as the tide retreated.

The hand gathering of shellfish (oysters, mussels and cockles) from estuaries, rocky pools was also a common place activity. Individual basket traps, often referred to as 'fixed engines', were often known under a variety of names, such as putts, putchers, putcheons and cribs etc. Generally dating to last 200 years putts and putchers were used exclusively for salmon. They were often arranged in ranks of several hundred in three or four tiers to form a weir. They were particularly efficient and could be extensive, such as that recorded at Count Rocks in Gloucestershire (in 1862) which measured almost three-quarters of a mile in length. Putcher ranks/ weirs were widely distributed in the Bristol Channel (in 1863 there were thought to be as many as 11,200 putts and putchers at work) and they are recorded as having done a lot of damage -

principally preventing fish reaching many rivers but also proving hazardous for navigation (Geraint Jenkins 1974, 44).

Fig 18 Lamprey fishing in the 15th century (after Tacuinum Sanitatis)

Fig 19 Putcher weir (700 baskets) on the Severn (copyright http://www.salmonboats.co.uk)

Another type of 'fixed engine' was the putt, comprising a woven basket with three parts dovetailed into one another to catch fish of all sizes – made from willow, hazel or whitethorn. Although putt fishing wasn't as widespread as putchers in the Bristol Channel, being limited to the Severn estuary, some arrays included up to 120 baskets (Geraint Jenkins 1974, 44). They were used at Goldcliff and Porton until the 1920s and aerial photos from 1945-7 and 1969 have identified numerous fish traps, mostly putts,

at intertidal rock platforms at Hayward Rock, Oldbury Flats, Aust Rock, and English Stones – Gravel Banks (Allen 2004).

Long-netting was employed in many estuaries and rivers, where nets were weighted to the bottom of the river by leads and buoyed by corks, often over considerable distances, often to trap salmon (Waters 1947, 39). Eels were also widely caught, in baited wicker baskets called putcheons and weels, although only in certain places (e.g.. below Gloucester) taken commercial quantities (Waters 1947, 43). The Severn is recorded as one of three major lamprey fisheries in medieval period in western Europe (Turner 2006).

At the beginning of the 14th century England and Wales were integrated into a network of European trade routes stretching from the Baltic to the Mediterranean, within which fish was an important commodity. Seine and drift netting was often practiced along the coast for mackerel and mullet, hake and pilchard, herring and salmon. Herring was the main commercial catch along with salmon particularly in the Severn and Taw estuaries (Starkey *et al* 2000, 26).

By the late 15th century as the western fisheries expanded many small vessels departed ports in Cornwall and Devon for Irish waters laden with cargoes of salt and returned 2/3 months later with holds full of herring, hake, cod and ling for the English market. The bulk of Irish fish passed through the western ports and especially through northern Somerset ports such as Ilfracombe, Minehead and Bideford, but also increasingly through Bristol which although not home to many fishermen served as the region's major fish market (Starkey *et a*l 2000, 27-8).

During the 14th and 15th centuries the technological developments in ship design and navigation enabled fishermen to sail to more distant offshore grounds. Bristol (along with Hull and London) came to dominate the expanding Icelandic fish trade and by the second half of the 16th century Westcountry fishermen had reached the rich grounds off Newfoundland; indeed it was the commercial wealth of Bristol merchants that helped fund Cabot's voyages (Starkey *et al* 2000, 28).

During the post-medieval period two particular fisheries stand out in the west country; those for herring and those for pilchard: the colder north coast of Devon was regarded as having herring, and the warmer south, pilchard (Starkey et al 2000, 82). Seine nets were the main means of catching pilchards down to the early 20th century.

Fig 20 Pilchards being stacked in 2004 for export to Italy (© Richard Greenwood and licensed for reuse under this Creative Commons Licence.)

The herring fishery may have been as economically important as that of pilchards in the 16th and 17th centuries. In 1630 herring were found off the north coast from Sept to the end of December. They were caught along the length of the north coast at Minehead, Porlock, Padstow, Lynton, Combe Martin, Ilfracombe and Clovelly. The fish were also caught offshore at Lundy Island (Starkey *et al* 2000, 82). By 1770 the herring fishery had been relegated to minor importance.

Pilchards were the mainstay of the Cornish fishing fleet and were caught in huge numbers. One shoal netted at St Ives weighed 1,050 tons and was estimated to contain more the 17 million fish. The seine nets required to take these catches were often more expensive than the vessels themselves and whole communities often took shares in them. The value of the catch often meant that shoals were often divided by 'stems', the invisible boundaries marked by headlands, across which the 'ownership' of a shoal would move from one village to another (Wheatley 2000. 123). As with mackerel the fishing was done inshore to ensure that the catch was always within a day's sailing of market. Fishing was the biggest factor in the county's economy in the 19th century and its decline has been severe.

By 1750 the most important distant-water fisheries were those off Newfoundland and New England which continued to be conducted from the South West. Trade peaked in the late 1780s- early 1790s after which it declined. From 300 south-western ships fishing off Newfoundland in 1792 only 15 were active in 1823. Direct involvement in the Newfoundland fishery ceased by the 1820s where upon it was conducted by Newfoundland's growing native populations (Starkey *et al* 2000, 73).

Early trawling activities appeared in mid 18th century albeit confined to stretches off the south-west and south-east coasts of England. For much of this period however many line fishery vessels still sailed further afield than the trawlers and the expanding markets of Bristol and Bath encouraged small trawling boats in the Bristol Channel e.g.. trawling for soles by Brixham craft (Starkey 2000, 74). Only when steam-powered trawlers developed and were able to reach the same deep offshore waters did trawling come to dominate the expansion of the fisheries.

From the late 18th century Devon men, reputed to be the most adventurous pioneers of the nascent trawling industry, had begun to move up the English Channel in search of more grounds – responding to the stronger market forces in London and the depleted nature of their own local grounds (Starkey *et al* 2000, 113). By the early 19th century they had in turn ventured further, and for similar reasons, into the North Sea.

The Fal Estuary, Cornwall is noteworthy for containing a unique oyster fishery where customs and rules dictate that only hand-pulled dredges and sail boats can be used. Many of the oyster boats, known as Falmouth Working Boats were built at boatyards around the Fal, with some of the oldest boats in the Oyster Fishery dating back as far as 1860. It is possible that the fishery has been exploited for many centuries and this is the only oyster fishery in Europe, and possibly the world, where such traditional methods must be used. More recently, the Falmouth Oyster Festival has been established to celebrate the start of the oyster season, which runs from October to March (Falmouth Oyster Festival website).

Fishing in the Bristol Channel started to decline as it developed into a major seaway, providing alternative outlets for maritime activity e.g. many fishermen opted to work as local pilots (Starkey *et al* 2000, 90).

In the present day Ilfracombe and Appledore are the two main commercial fishing ports in North Devon with only a handful of licensed vessels in smaller ports such as Clovelly, Minehead and Weston Super Mare. Pelagic trawling and scallop dredging do not take place in the Bristol Channel and Severn Estuary and in general commercial fishing by way of trawling or netting does not take place in the Severn Estuary due to strong tidal streams (S Renfrew pers comm 2010).

Fig 21 Fishing boats, Brixham harbour. (Photograph; Cornwall Council.)

On the south coast of Cornwall and Devon are many fishing ports, the largest and most significant being Newlyn, Cornwall and Brixham, Devon. In Dorset there are fewer fishing ports but significant centres of fishing activity include Weymouth and Poole.

Components of this Type include: bait digging, bottom trawling, shellfish collection, fixed netting, hand netting, long lining, seine netting, drift netting, pelagic trawling, demersal trawling, fishing grounds, potting, shellfish dredging, fish markets, fish warehouses, fish trapping.

VALUES AND PERCEPTIONS

Modern fisheries are increasingly coming to the attention of the wider general public with the concern that there is over fish stocks and sustainable practice. Fishing communities livelihoods are intimately tied to the productivity of the seas.

Modern perceptions of fishing are often that it is now destructive of fish stocks and the sea-bed. But it is also still seen as an important element in the local economy in many places.

Striking a balance between the needs of fishermen and those involved in marine conservation work is important if working partnerships are to be maintained and the sustainable use of the sea promoted (des Clers *et al* 2008).

RESEARCH, AMENITY AND EDUCATION

Bottom trawling has provided one of the first indicators of the wealth of the submerged prehistoric archaeology of the English Channel and Bristol Channel. Trawling and dredging have recovered material that otherwise would have gone undetected, and have raised the public and professional profile of submarine archaeology.

There is considerable potential for further research into the history of fishing, particularly its early development and the numerous catching, storing and processing techniques employed. Such research could inform strategies for sustainable fisheries, using the historic environment to identify patterns, trends and materials used. The potential for social and economic research also exists.

The Strategy for the Severn (2001) identifies issues regarding the future of heritage fisheries on the Severn. It notes that traditional salmon fishing practices such as 'fixed engines', putchers and lave nets, whilst part of the region's cultural heritage, are practices in decline, due to the competition from commercial fish farms and the rising costs of licences. Nevertheless further research is required as traditional techniques still have an adverse impact on the Estuary's salmon population and there is a need to assess the impact of traditional methods and to promote the sustainable level that encourages the protection of fish stocks (Severn Estuary Partnership 2001).

Projects such as Finding Sanctuary have been successful in delivering a wealth of information about detailed fishing activities in the South West (des Clers *et al* 2008). The participatory approach with fishermen has a lot to offer archaeological and historical assessments and to place the fishing industry in historical context providing valuable information about the complex patterns of activities and the fishing gear types used, the seasonal use and even local ecological knowledge.

CONDITION AND FORCES FOR CHANGE

The fisheries represent the 'farming use of the sea' and more is known about their practice than the exact locations of specific areas of historic activity. Some fishing practices will impact on physical remains more than others – the obvious distinction being between the more damaging trawling methods and less damaging netting and long-lining methods. The material evidence left by trawling activities includes, most noticeably, the trawl scars on the seabed itself. The destructive tracks tear and break up the surface of the seabed. Whilst on the one hand this offers an opportunity to recover otherwise missed archaeological artefacts, on the other it clearly disturbs deposits and features.

Gear and nets often become snagged on the rocky bottom and on obstructions and wrecks. Nets, lines, hooks, anchors and the vessels themselves, are lost or abandoned. These features occur more frequently in those areas identified as 'hazardous foul grounds', being 'hitchy', 'catchy, 'sharp' or 'rough'. Any survival of objects, however, depends on materials used and local environmental conditions.

Concerns about overfishing first appeared in the mid 19th century and the Acts of 1861, 1865 and 1923 limited the use of 'fixed engines' ie weirs and fixed permanent traps (Geraint Jenkins 1974, 31). This has led, in time, to the abandonment of many weirs and such practices on a wide scale. Similarly and due to government supported buyouts and Net Limitation Orders commercial salmon fishing in the Severn Estuary and River has declined in productivity and importance in recent years. Drift nets, draft nets (seine or long nets), the traditional methods of 'fixed engines' (putts and putchers), and hand-held lave nets have all steadily reduced (Severn Estuary Partnership 2001, 99).

Sea-fishing and angling from the shore and from boats on the Severn Estuary is a popular leisure activity and contributes significantly to local economies. Commercial fishing for white sea fish also takes place, including trawling, longlining, and the use of beach nets for cod, whiting, bass, sole, plaice and mullet. There is very little shell fishing on the Estuary (Severn Estuary Partnership 2001, 100).

The Environment Agency regulates commercial and recreational fishing for migratory species such as salmon, sea trout and eel out to 6 nautical miles. In the Severn estuary commercial fishing for salmon is limited to areas and methods along the Welsh EA coastline and Midlands region where historic 'rights of privilege' allow licensed putt and putcher ranks and hand held lave nets (N Turner, Environment Agency, pers comm).

The erosion of the mud flats in many of the low lying areas of the west country and in estuaries means more fish traps and similar apparatus may be revealed as climate change causes sea-level rise and increased storminess (Brunning 2007).

Inshore Fisheries and Conservation Authorities (IFCAs) have been given broad conservation remits that includes the marine cultural heritage out to 6 miles. This will

mean that they may require professional advice and data from LPA historic environment services which themselves need to improve their coverage of marine and maritime records.

RARITY AND VULNERABILITY

The Fisheries of the south west have a long and complex history and contribute a distinctive and important aspect in the history of British fisheries. Traditional fishing practices such as long-lining have been declining since the advent of trawling. Generally fisheries are in a period of remittance, quotas and restricted fishing grounds impacting on the scale, range and sustainability of the mid-late 20th century industry. Important archaeological finds associated with wrecks, inshore fishing and coastal potting areas may further inform the nature and finer details of the history of this industry. Medieval and earlier, prehistoric practices are likely to have left evidence as yet uncovered.

Archaeological sites and wrecks are likely to be vulnerable to erosive environmental marine processes and the longer the submergence the greater the deterioration. Any lost gears or other equipment made from organic material would rapidly break down, although metal fittings and such like may still be evident.

Intrusive offshore industries may also impact on the material culture left by fishing in the same way they impact on palaeolandscapes and wrecks.

PUBLISHED SOURCES

Allen, J R L, 2004. Fishtraps in the Middle Severn Estuary, *Archaeology in the Severn Estuary* **15**, 31-48

Brunning, R, 2007. A millennium of fishing structures in Stert Flats, Bridgwater Bay, Inner Bristol Channel, *Archaeology in the Severn Estuary* **18**, 67-83

Dellino-Musgrave, V and Ransley, J, 2013. Early Modern and Industrial, c 1650-1850 in People and the Sea: A Maritime Archaeological Research Agenda for England, Ransley, J, Sturt, F, Dix, J, Adams, J, Blue, L, eds, *Council for British Archaeology Report* **171**

Des Clers, S, Lewin, S, Edwards, D, Searle, S, Lieberknecht, L, and Murphy, D, 2008. *Fishermap. Mapping the Grounds: recording fishermen's use of the seas,* final report, Finding Sanctuary Project

Fox, U S A, 2001. *The evolution of the fishing village; landscape and society along the South Devon coast, 1086-1530*, Oxford: Leopard's head Press

Geraint Jenkins, J. 1974. *Nets and Coracles,* Newton Abbot: David & Charles

Serjeantson, D, and Woolgar, C, 2006. Fish Consumption in Medieval England in C M Woolgar, D Seargeantson and T Waldron, eds, *Medieval England: Diet and Nutrition, Medieval History and Archaeology*, Oxford: Oxford University Press.

Severn Estuary Partnership, 2001. *Severn Estuary Joint Issues Report 1997.* Department of Earth Sciences, Cardiff University

Starkey, D *et al*, 2000. *England's Sea Fisheries: The Commercial Sea Fisheries of England and Wales since 1300.*

Turner, R, 2006. A surfeit of Lampreys, *Archaeology in the Severn Estuary* **17**, 161-8

Waters, B, 1947. *Severn Tide: a study of the upper part of the tidal estuary of the Severn: its inshore fishing, cider making, and shipping; history, local life and lore*, London

Wheatley, K, 2000. *Guide to Maritime Britain,* London: National Maritime Museum

WEBSITES

http://www.salmonboats.co.uk/1153.html (Salmon fishing on the River Severn)

http://www.falmouthoysterfestival.co.uk/fishing.html (Falmouth Oyster Festival)

http://www.severnestuary.net/ (Severn Estuary Gateway - A Portal to the Estuary Management Groups on the Severn)

1.2.3.2 Character Type: Aquaculture

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

Aquaculture is the commercial farming of aquatic organisms in inland and coastal areas, which involves intervention in the rearing process to enhance production and cultivate stock. In the UK, types of aquaculture range from intensive farming, where fish are held at relatively high density and all feed is provided by the farmer (including salmon, trout, turbot and pilot volumes of halibut and cod) to extensive farming of shellfish, where the intervention is limited to the supply and redistribution of juveniles either from hatcheries or the wild (including some scallop, mussel and cockle production).

The sheltered bays and estuaries of south coast of the region, particularly in Devon and Cornwall provide ideal environments for farming arrange of species, with shellfish dominating the region's aquaculture industry. These include the Duchy of Cornwall Oyster Farm on the Helford estuary and the Fal estuary oyster fishery in south west Cornwall, and pacific oyster farms in most of the south Devon estuaries: the Exe, Teign, Avon and Yealm and Salcombe and Kingsbridge. Most of these estuaries are owned by the Duchy of Cornwall.

Mussels, clams and cockles are also farmed or taken from the wild. There is also a lobster hatchery at Padstow on the north Cornwall coast.

HISTORICAL PROCESSES: COMPONENTS, FEATURES AND VARIABILITY

The exploitation of shellfish has a long history in the South West. For example, the oyster industry in the Helford Estuary is said to have its origins during the Roman period. There is no direct evidence to support this, but it is highly likely that the local populations harvested the oysters well for their own consumption well before this period. The commercial farming of oysters probably developed here with demand throughout the medieval period (Reynolds 2000, 12).

Today the oysters are trawled from the Helford, Frenchman's Creek, and the Fal by sailing boats and brought to Porth Navas, a side creek of the Helford, where they are graded (1 to 5) according to size and put into aerated concrete tanks, where they might take five to seven years to grow. Undersized oysters are used to re-seed the beds (Gill 1987, 183-4).

Oyster shells were recovered from medieval contexts during recent excavations at Restormel Castle and these are likely to have come from the nearby Fowey or Looe Estuaries.

Historically the Helford was famous for the Native Oyster, although since the 1950s, other species such as Pacific oysters, clams and mussels were also brought in to be fattened in cages in the river or on the river bed. The oyster beds which are located some way upriver from its mouth are marked by perches or withies to warn boats to keep clear and avoid damaging the fragile shellfish (Helford Voluntary Marine Conservation Area website).

Typical components of this Character Type include shellfish farms, fish farms, oyster beds, fish quays and wharfs.

Fig 22 Native oysters from the Helford Estuary. (Photographs; Tony Sutton, Helford Marine Conservation Group)

VALUES AND PERCEPTIONS

This Character Type can be an important part of local distinctiveness and the character of estuaries and seaside seaside towns and villages attracting tourists and day trippers who congregate around seafood stalls or fish markets many of the coastal destinations of the region. The oyster racks in the Teign estuary are visible at low tide from the Penzance to London trains passing beside the estuary's northern shore.

RESEARCH AMENITY AND EDUCATION

Research has been on-going since the mid 19th century, with a strong focus on issues such as over-fishing in its broader sense.

In mid-October every year the Falmouth Oyster Festival is held to celebrate the beginning of the dredging season and every November 5th there is a race in the Carrick Roads that can only be won by an active oyster fishing boat and fishermen.

CONDITION AND FORCES FOR CHANGE

Market competition is increasing on a global level. The popularity of alternative species such as farmed sea bass and cod, along with more 'sustainable' varieties from non-aquaculture fisheries, such as pollock and hoki, puts pressure on the traditional species in the market; although there is no deep sea fish farming yet.

The rising costs of fish feed and fuel prices present additional concerns for aquaculture, as do levels of fish-disease and parasites at fish farms and the effects on wildlife of nutrient leakage enriching surrounding waters. In 1980 only 9% of fish consumed came from aquaculture, now it is 43%. Fish consumption per capita forecast to grow by 50% by 2030. Maintaining sustainable fish stocks is becoming increasingly important and controlled by the EU. Consumer demand for sustainably sourced fish is likely to increase.

Worldwide fish stocks are declining each year. Increasing consumer demand for fish protein however, motivates aquaculture production to supplement and replenish the wild reserves in order to satisfy this demand. On the North Cornish coast the National Lobster Hatchery in Padstow is promoting a sustainable approach to harvesting, releasing young lobsters raised in the hatchery around the coastline to restock and support the lobster population.

Increasing requirements on all aquaculture production businesses to meet regulations and points of compliance are to be authorised by regulatory bodies.

RARITY AND VULNERABILITY

Today there are an estimated 55 aquaculture businesses in the South West, and traditional methods are still often used.

This Type is vulnerable to pressures from the tourist industry and current marine human activities as well as environmental processes. In particular, accidental pollution of the water is an ever-present and serious threat to this Type.

PUBLISHED SOURCES

Cornwall Council, 2012. *A future for Maritime Cornwall: The Cornwall Maritime Strategy 2012-2030,* Truro: Cornwall Council

Gill, C, ed, 1987. *The Duchy of Cornwall*, Newton Abbot: David & Charles

Reynolds, A, 2000. *Helford Estuary Historic Audit*, Truro: Cornwall Archaeological Unit

Shepherd, C J, ed, 2008. *William Daniell: A Voyage Round the Coast of Great Britain*, London: The Folio Society

Wheatley, K, 2000. *National Maritime Museum Guide to Maritime Britain*, London: Caxton Editions

WEBSITES

http://helfordmarineconservation.co.uk/the-helford/food-from-the-sea/ (Helford Voluntary Marine Conservation Area)

http://www.cornishnativeoysters.co.uk/mylor.html (Cornish Native Oysters website)

http://www.nmmc.co.uk/ (National Maritime Museum Cornwall)

http://www.duchyofcornwall.org/aroundtheduchy_thewaters.htm (Duchy of Cornwall website)

1.2.4 Broad Character: Ports and Docks

1.2.4.1 Character Type: Ports and Docks

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type relates to the functioning of ports and docks, together with their harbours and associated port-related industry and range of material features and imprints. They can comprise dockyards, wet docks, harbours, landing points, working piers, quays, breakwaters, terminals, and warehouses. The South West region has many ports and docks around its coast for example: Bristol, Portsmouth, Penzance, Falmouth, Plymouth, and Poole.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Whilst seaborne traffic has been a strong element in British prehistory since the Neolithic period, it is only in the Iron Age that there is archaeological evidence for a port. Prior to this ships and boats are likely to have been dragged up onto sheltered beaches and mudflats and any evidence is likely to be in the form of settlements and artefact concentrations. Mount Batten, a sheltered promontory in Plymouth Sound shows a sudden growth in metalworking and evidence for trade with Penwith, Dorset, and Brittany from the 8th century BC (Cunliffe 1988). Evidence for more permanent port facilities appear at Poole Harbour in the late 3rd century BC and at Hengistbury Head in the early 1st century BC, in the form of jetties and a gravel hard adjacent to an inlet respectively (Parfitt 2004, 100).

During the Roman occupation Poole Harbour continued to be a major civilian port and others were established at Exeter and Gloucester (Mason 2003, 116). Topsham appears to have housed the port and supply base that served Exeter and there is evidence that Seaton may have housed a Roman port (Rippon 2008, 86). Military ports may also have been used by civilian traffic. These would all have had quays and jetties, warehouses, and administrative buildings.

Smaller native settlements with less infrastructure will have existed around the coast. An example of one of these may be represented by Lellizzick, seaward of Padstow on the Camel Estuary, where up to 70 circular structures representing a multi-phase

settlement spanning the Roman and Post-Roman periods show evidence of trade with continental Europe throughout the settlement's lifetime. Boats would have been drawn up onto the sheltered beach immediately below the settlement. Similar arrangements would have occurred at nearby Tintagel during the Post Roman period, where there is evidence of substantial trade with Mediterranean Europe.

Larger Romano-British settlements can be found at Portishead, Clevedon, Weston-Super-Mare, Combwich, and Crandon Bridge on the shores of the Severn Estuary; some or all of these may have functioned as ports (Rippon 2008).

A settlement at Bristol was established in Saxon times at the confluence of the rivers Avon and Frome. A bridge was built across the Avon and the settlement was known as Brycgstow, 'the place at the bridge', first mentioned in the Anglo Saxon Chronicle in 1051 (Aughton 2000, 6). William of Malmesbury, writing in 1125, was able to describe it as a place 'where there is harbour able to receive ships coming from Ireland, Norway and other lands overseas: thus a region so blessed with home-grown riches need not go without traffic in foreign wealth' (Winterbottom, ed, 2007, 447). It emerged as England's second largest port after London during this period.

Plymouth developed into a port in the 13th century from its origins as the small fishing village of Sutton. The growth of the town appears to be a direct result of the silting up of the Plym, probably the result of streamworking, rendering the previously prosperous port of Plympton unusable for maritime vessels. The working of ground for tin upstream considerably altered the fortunes of some port towns on the estuaries of west Devon and Cornwall: as estuaries silted up many became cut off beyond the reaches of the tide and their formerly vibrant economies often stalled. Examples include Tregony and, ironically, the stannary towns of Helston and Lostwithiel. Plymouth, on the other hand, continued to expand, in the process incorporating neighbouring settlements such as Stonehouse, itself a thriving port boasting its own town walls (Rippon and Croft 2008, 199, 201).

Fig 23 Weymouth harbour, Dorset. (Photograph; Cornwall Council.)

Many smaller fishing settlements associated with the Cornish place-name element *porth*, landing place, sprang up around the coast, including Port Isaac, Port Quin, Porthgwarra, and Portholland. Here vessels could be run aground at low tide, unloaded,

and then refloated on the rising tide. Coal and lime for use in agriculture and general supplies were the main products moved in this way (Rippon and Croft 2008, 198; Bone and Dawson 2008, 227).

Many of our smaller modern ports emerged in the medieval period as a response to an increase in maritime trade and fishing. Examples from Cornwall include Padstow, St Ives, Penzance, Penryn, Fowey, and Looe. It was noted by Leland that piers could be found at Penzance, Newlyn, Mousehole, and St Ives. The requirements of the mining industry led to the creation of new port facilities at Portreath, Porthleven, Pentewan, Charlestown, and Par in the late 18th and early 19th centuries. Charlestown was built as a floating dock for the shipment of copper ore but was used subsequently to handle china clay as that industry grew. Pentewan fell victim to the industry it had been found upon as it silted up as a result of waste from china clay extraction. Many quays were constructed in the region's estuaries, particularly the Fal, Tamar, and the Dart principally to land lime and kilns can often be found in these locations (Bone and Dawson 2008, 228).

The port of Falmouth developed in the shelter of Pendennis and St Mawes castles from the mid-16th century onward and is still one of the region's most important port and docks. Falmouth was also of national strategic importance as Britain's first maritime port of call for shipping entering the Western approaches from the west and 'To Falmouth for orders' was a famous maritime phrase. In the 1840s a local paper reported 'Two hundred sail of merchantmen chiefly corn-laden, awaiting orders' in the Falmouth Roads (Wheatley 2000, 119).

Fig 24 Portbury Docks in *c*1880. (Graham Farr archive, courtesy of the Friends of Purton.)

During the post-medieval period Bristol and Plymouth became the most important ports in the region, the former in commerce and as part of the slave trade, the latter predominately for military reasons (Dellino-Musgrave and Ransley 2013). The quays in Bristol became docks when the Floating Harbour was constructed during the 19th century. However, the advent of larger shipping in this period led to the demise of Bristol as a commercial port. To counter the problem a number of schemes were put forward including extending the Floating Harbour to the mouth of the Avon but it was a plan to build new facilities at Avonmouth that prevailed. A group of Bristolians opened the new docks in 1877 as another facility was constructed at Portishead nearby. The two new docks did not perform well economically and were taken over by the Bristol

Corporation in 1884 which led to the expansion of the Avonmouth Docks between 1902 and 1908 with the construction of the Royal Edward Dock (Brett 1996). Whilst Avonmouth has flourished, perhaps aided by the opening of the Royal Portbury Dock on the southern side of the Avon in 1978, Portishead declined as a port and is now undergoing substantial redevelopment with a marina and housing replacing the dock facilities

Although Plymouth was primarily a military port it also retained an important function as a fishing harbour with facilities at Sutton Harbour. To the east, Millbay Dock developed in the middle of the 19th century as a terminal for mail and passenger traffic and is now a thriving ferry terminal with a route to Brittany and a marina. Despite modern development some period features survive (Bone and Dawson 2008, 227).

Associated structures such as warehouses, customs facilities, and bonded stores were located at the dockside and a particularly well-preserved example of this suite of buildings can be found at Exeter (Bone and Dawson 2008, 228). Shipbuilding was carried out in many yards throughout the region with important centres at Bristol, Appledore, Falmouth, and Plymouth, although the latter's facilities are primarily for naval work. Bridport has been a famous centre of rope-making since the medieval period.

Portland was first developed as a naval port in the mid 19th century with the construction of a series of breakwaters, dock facilities and further military infrastructure on the adjacent coastal land, with later additions and changes in subsequent periods. The harbour area had been an important anchorage in the later medieval period and Portland and Sandersfoot castles were built as part of Henry VIII's coastal defences in the 16th century, but it was not until the first breakwater was built that it gave significant protection to a large number of ships. Portland continued as a naval port and base until 1996 and once decommissioned has developed into a commercial port offering a wide range of services (Portland Port website).

Fig 25 The 18th century pest house on St Helen's in the Isles of Scilly. (Reproduced by kind permission of Rhiannon Philp)

Smaller ports in Dorset can be found at Lyme Regis and West Bay, Bridport, both of which required substantial works to keep open. Poole and Weymouth were more blessed in terms of possessing good natural harbours. All were engaged in substantial

trade with North America in the 18th and 19th centuries (Bone and Dawson 2008, 227). Poole and Weymouth today are busy ferry ports with routes to Cherbourg, St Malo, and the Channel Islands.

Amongst the quarantine areas in the region is the 18th century 'pest house' on the island of St Helen's in the Isles of Scilly. Accompanied by other elements including a quay, well and field system, it served the quarantine anchorage of St Helen's Pool.

Typical components of this Character Type include: landing stages, wharfs, jetties, pontoons, slipways, terminals; port administration and regulation areas; slipways with cranes or ramps; cargo-handling equipment, storage facilities; custom areas, quarantine areas; pilot stations, small craft facilities; wrecks; lighthouses, batteries; rope-walks; specifically associated transport systems (such as railways, roads, tramways).

VALUES AND PERCEPTIONS

In the South West region, there are many ports that are still in use. They possess long, complex and dynamic histories that have been built up through many centuries. There are also a few that are now abandoned, serving as a reminder of some of the once thriving industries in the region. Others may survive inland from the existing wharves or coastline such as the Romano-British port of Crandon Bridge which now lies 2km from the nearest navigable river, a situation created by the cutting of a new channel for the River Parrett in 1677-8 (Rippon 2008).

Dockyards are still significant components of ports in the region and for many people they are reminders of past employment and glorious days in the history of the South West. In some cases, docks are adopting new roles as recreational facilities such as marinas or as coastal and maritime heritage centres. Some have continued serving as commercial ports in the form of ferry terminals and are important as offering the first impressions of England gained by foreign visitors using them.

Several ports in the region, such as Falmouth, could be perceived as partly recreational since they are used by pleasure boats and leisure craft as well as commercial shipping.

Smuggling could be perceived as an exciting and romantic aspect of the history of the South West coast, with its suggestion of hidden contraband, secrecy, and suspicion.

RESEARCH, AMENITY AND EDUCATION

The region's ports and docks form fitting locations for a breadth of educational and leisure resources. These include Bristol's Maritime Heritage Centre (Brunel's SS Great Britain website) and the National Maritime Museum in Falmouth (National Maritime Museum Cornwall website). From their distinctive character, many ports also form popular visitor destinations in their own right but their amenity roles extend much further: Charlestown for example has served as a period film set on many occasions. The wealth of surviving historic features has also informed proposals for heritage-led regeneration for a number of former ports in decline, Hayle being a clear example.

Generally document-based histories of ports and harbours are plentiful, as well as work on coastal wrecks, but there is still much that can be learnt from the further study of harbours and their material remains, both extant and ruined. Specifically much needs to be done on the ports of this study area. Knowledge of levels of investment into structures, together with their capacity, mode of use, etc, can inform maritime histories. The potential for using visits to harbours to illustrate local history courses in schools and in further education is as great as the potential they have to inspire historians and writers.

CONDITION AND FORCES FOR CHANGE

In the South West region, there are many ports that are still in use. They possess long, complex and dynamic histories that have been built up through many centuries. There are also a few that are now abandoned, serving as a reminder of some of the once

thriving industries in the region. Others may survive inland from the existing wharves or coastline such as the Romano-British port of Crandon Bridge now lies 2km from the nearest navigable river, a situation created by the cutting of a new channel for the River Parrett in 1677-8 (Rippon 2008).

Forces for change include the impacts of climate change, neglect, reuse for other activities such as marinas or development to accommodate large cruise ships, such as Falmouth, or improved ferry links such as Penzance, Cornwall and St Mary's, Isles of Scilly.

The functions of ports and docks may have changed in recent years but many still retain some of their original features. The Floating Harbour at Bristol, for example, retains its engineering features even following its conversion to leisure use although many of the surrounding infrastructure has been redeveloped.

RARITY AND VULNERABILITY

The South West for the character of its many ports and harbours which retain their original charm and functionality. Charlestown is an outstanding survival of a 19th century port and this is reflected in its inclusion within the Cornwall and West Devon Mining World Heritage Site and in its repeated use as a set for period productions. However, the components of this Character Type can subject to development pressure as waterside locations are often seen to be desirable and profitable.

PUBLISHED SOURCES

Aughton, P, 2000. *Bristol: a people's history*, Lancaster: Carnegie

Brett, J, 1996. Archaeology and the construction of the Royal Edward Dock, Avonmouth, 1902-1908, *Archaeology in the Severn Estuary* **7**, 115-20

Cunliffe, B, 1988. *Mount Batten Plymouth. A prehistoric and Roman port*, Oxford

Dellino-Musgrave, V and Ransley, J, 2013. Early Modern and Industrial, c 1650-1850 in People and the Sea: A Maritime Archaeological Research Agenda for England, Ransley, J, Sturt, F, Dix, J, Adams, J, Blue, L, eds, *Council for British Archaeology Report* **171**.

Mason, D J P, 2003. *Roman Britain and the Roman Navy*, Stroud: Tempus

Parfitt, K, 2004. A search for the prehistoric harbours of Kent, in Clark, ed,

Rippon, S, 2008. Coastal Trade in Roman Britain: the Investigation of Crandon Bridge, Somerset, a Romano-British Transshipment Port beside the Severn Estuary, *Britannia* **XXXIX**, 85-144

Rippon, S, and Croft, B, eds, 2008. 'Post-Conquest Medieval', in C J, Webster, ed, 2008, *The Archaeology of South West England, South West Archaeological Research Framework: Resource Assessment and Research Agenda*, Taunton: Somerset County Council, 195-208

Wheatley, K, 2000. *National Maritime Museum Guide to Maritime Britain*, London: Caxton Editions

Winterbottom, M, ed, 2007. *William of Malmesbury: Gesta Pontificum Anglorum, The History of the English Bishops: Volume I: Text and Translation* (Oxford Medieval Texts), Oxford: Oxford University Press

WEBSITES

http://www.portland-port.co.uk/ (Portland Port)

http://news.bbc.co.uk/1/hi/england/2266789.stm (BBC News - Iron Age port in Poole Harbour)

http://www.ssgreatbritain.org/Home.aspx (Brunel's SS Great Britain)

http://www.nmmc.co.uk/ (National Maritime Museum Cornwall)

1.2.5 Broad Character: Coastal Infrastructure

1.2.5.1 Character Type: Flood and Erosion Defence

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type relates to provision of structures designed to remove, reduce or mitigate the risk of coastal and estuarine flooding from the sea, rivers or un-channelled rainfall run-off, or to counter losses to coastal land from marine erosive forces. In practice, along the coast the concepts of both flood and erosion defence are commonly incorporated in one and the same structure, though their character in terms of siting, design and build may be more heavily influenced by the one or the other at different locations.

The national policy for the management of the coast is set out in Defra's 'Adapting to Coastal Change: Developing a Policy Framework' (Defra 2010). Together with local authorities the Environment Agency manages the physical risks of flood and coastal erosion and flooding risk on the coast through its oversight for the production and quality control of Shoreline Management Plans (SMPs). SMPs provide a large-scale assessment of the physical risks associated with coastal processes and present a long term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner. An SMP is a high level document that forms an important element of the strategy for flood and coastal erosion risk management. The first generation of SMPs were completed in the 1990s, the second round (SMP2) are now in progress.

The South West region is divided into the following SMP areas: Anchor Head to Lavernock Point – Severn Estuary Coastal Group (SECG); Hartland Point to Anchor Head - North Devon and Somerset Coastal Advisory Group (NDASCAG); Rame Head to Hartland Point - Cornwall and the Isles of Scilly Coastal Advisory Group (CISCAG); Durlston Head to Rame Head - South Devon and Dorset Coastal Advisory Group (SDADCAG).

Large-scale defences are infrequent on the relatively gentle coastline between Dorset and Falmouth and on the rugged coastline between Falmouth and West Somerset, being mainly confined to the seafronts of towns and villages, or to areas of reclaimed land in the upper reaches of the estuaries, especially the Tamar and Camel. However, between Porlock and the upper tidal limit of the Severn they are much more widespread in rural contexts. Here large-scale reclamation of low-lying and formerly intertidal land has resulted in the construction of large sea banks over several millennia.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

In the area of the Severn many of these sea banks are associated with drainage and reclamation but some are thought to be coastal defences dating back to the Roman period such as the Great Wall at Elmore, Gloucestershire while medieval sea defences have been identified at Clevedon, Severn Beach, Awre, and Slimbridge (Mullin *et al* 2009, 49, 50). Substantial sea walls are in place around the mouth of the River Parrett protecting Hinckley Point and Burnham-on-Sea (NDASCAG 2010). Sea defences may also take the form of rock revetments, rock armour, gabions, and steel sheet piling, and also tidal barriers in some harbours such as that at Polperro, Cornwall (CISGAG 2010, 1). Road and railway embankments serve as *de facto* coastal protection such as those on the west bank of the Severn at Woolaston, along the west bank of the Fowey around Golant (CISCAG 2010, 1), and in Mount's Bay (CISCAG 2010, 4).

More substantial sea walls and breakwaters can be found protecting many coastal towns throughout the region, some forming long and imposing sea fronts such as those at Penzance, Cornwall (CISCAG 2010, 4). Sea walls may be built of masonry (e.g.

Falmouth), concrete and blockwork (e.g. Sidmouth), and occasionally blockwork. These may be further protected by stone revetments or concrete aprons to seaward. Splash walls may be present on the landward side.

Fig 26 Sidmouth, Devon – sea defences. (Photograph; Cornwall Council.)

Low cliffs along the banks of the Severn are protected by more recent walls as at Sudbrook and Beachley. Higher cliffs at for example Newquay are also protected by defensive structures (CISCAG 2010, 6). Lower-lying land is protected by embankments such as those between Aust and New Passage (SECG 2010, 47) and earth bunds are commonly used on both banks of the Severn to protect low-lying areas further upstream, and in the upper reaches of the Camel estuary near to Sladesbridge.

Groynes are in place throughout the region to prevent movement of sediments from selected parts of the coastline, though they can lead to sediment starvation elsewhere. Locally known as cribs on the Severn they can be found upriver from Purton (SECG 2000, 75). Groynes are also used to protect harbours such as those at Minehead (NDASCAG 2010, 69). Structures are usually of concrete such as those at Charlestown, or rock as at Sidmouth (SDADCAG 2009, 114).

Flood defences are in place along many rivers including those sections within a maritime context. These include modern defences built as a response to flooding events such as those at Boscastle. Canal sea gates, such as those at Bude, may also perform a flood defence function (CISCAG 2010, 8).

Some defences have been emplaced to protect sand dunes, such as those on Bryher, Isles of Scilly, which protect lower lying areas inland from flooding (CISCAG 2010, 9).

Typical components of this Type can include breakwaters, groynes, sea walls, dykes, embankments.

VALUES AND PERCEPTIONS

Sea and flood defences are generally seen as essential for the preservation of coastal settlements. This has been reinforced by recent flooding events at Lynmouth (1952) and Boscastle (2004) as well as growing awareness of the potential impacts of climate change, although some people perceive the more recent sea defences as having a detrimental effect on the overall picturesque character of the region's coast.

The effects of human tampering with natural defences such as beaches, for instance, the extraction of beach sand for aggregate that led to the destruction of the village of Hallsands in Devon in 1917, have also entered the public consciousness (Wikipedia entry for Hallsands).

RESEARCH, AMENITY AND EDUCATION

The components of this Character Type could be further explored as tools in creating regional distinctiveness, developing wider education and raising public awareness of the region's links with the sea. Coastal change and the process of reclamation of land from the sea are of paramount importance to those who live within the protection of coastal defences as well as to a wider audience concerned with the potential impacts of sea level change.

Historical features may be affected by human developments as, for instance at Carlyon Bay, St Austell where a large sandy beach was created by the deposition of material derived from ore-washing and china clay production in the 19th century. This artificial beach is now potentially under threat from the cessation of sediment deposition in local rivers and from the proposed construction of sea defences on the beach itself.

Consequently, when developing future sea defences, it is important to consider aesthetics and historic character, as well as the effect they are likely to have on other historic features.

CONDITION AND FORCES FOR CHANGE

The main forces for change in the region are the continuous changes in man's relationship with the sea, intensified by the effects of climate change potentially impacting on flooding and coastal erosion. These impacts include sea level rise and the potential increase in intensity, severity, and frequency of coastal storms, and rainfall events affecting flooding in fluvial catchments and urban surface water systems (DEFRA 2006). Estimates suggest that net sea level rise in the South West could be between 20 and 80cm by the 2080s with increased incidence of coastal flooding and coastal squeeze (Cornwall Council 2012).

Sea defence policy is also a major force for change. Modifications in such policy have produced significant alterations in the types and locations of this Character Type, particularly arising from the recognition of the need for sustainability (Val Baker *et al* 2007).

The greater awareness of the possibility of rising sea levels as a result of climate change may lead to a policy of managed realignment in areas thought to be beyond reasonable protection or 'holding' or (rarely) 'advancing the line' where protection is essential or feasible (NDASCAG 2010, 2). For instance, groynes are seen as a short term solution for 'holding the line' on sections of coastline at risk from erosion as at Dunster (NDASCAG 2010, 3).

RARITY AND VULNERABILITY

Coastal defences are fairly common in the South West and their associated structures are usually not designated. The vulnerability of this Character Type could be intensified if erosion rates increase.

PUBLISHED SOURCES

Cornwall Council, 2012. *A future for Maritime Cornwall: The Cornwall Maritime Strategy 2012-2030,* Truro: Cornwall Council

Cornwall and the Isles of Scilly Coastal Advisory Group (CISCAG), 2010. *Cornwall and Isles of Scilly Draft Shoreline Management Plan*, Royal Haskoning

Defra, 2006. *Flood and Coastal Defence Appraisal Guidance FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts*, London: Department for Environment, Food and Rural Affairs

Defra, 2010. *Adapting to Coastal Change: Developing a Policy Framework*, London: Department for Environment, Food and Rural Affairs

Fulford, M, Champion, T, Long, A, eds, 1997. England's Coastal Heritage: A Survey for English Heritage and the RCHME. *RCHME/EH Archaeological Report* **15**. London: EH/RCHME

Mullin, D, Brunning, R, and Chadwick, A, 2009. *Severn Estuary Rapid Coastal Zone Assessment Survey, Phase 1 report*, English Heritage

North Devon and Somerset Coastal Advisory Group (NDASCAG), 2010. *Shoreline Management Plan Review (SMP2) Hartland Point to Anchor Head Summary of Draft Final SMP*, Halcrow

Severn Estuary Coastal Group (SECG), 2000. *The Severn Estuary shoreline management plan (SMP1): the non-technical summary*, Gifford Associated Consultants

Severn Estuary Coastal Group (SECG), 2010. *Severn Estuary SMP2 Review. Appendix C: Baseline Understanding of Coastal Behaviour and Dynamics*, Coastal Defences and Baseline Scenario Report

South Devon and Dorset Coastal Advisory Group (SDADCAG), 2009. *Shoreline Management Plan SMP2 Durlston Head to Rame Head. Appendix C – Baseline Processes Understanding*, Halcrow

Val Baker, M, Tapper, B, Johns, C, Herring, P, 2007. *England's Historic Seascapes: Scarborough to Hartlepool and Adjacent Marine Types*, Truro: Historic Environment Service, Cornwall County Council on behalf of English Heritage

WEBSITES

http://archive.defra.gov.uk/environment/flooding/manage/coastalchange.htm (DEFRA - adapting to coastal change)

http://en.wikipedia.org/wiki/Hallsands (Hallsands)

http://www.victoriacountyhistory.ac.uk/sites/default/files/work-in-progress/Elmore_Introduction_6403.pdf (Victoria County History Gloucestershire)

http://www.severnestuary.net/secg/NON%20TECHNICAL%20SUMMARY.pdf (Severn Estuary Shoreline Management Plan – Non-Technical Summary)

http://www.severnestuary.net/secg/docs/public%20consultation/Appendix%20C%20Task%202-2%20Baseline%20Scenarios%20Nov%2009.pdf (Severn Estuary Shoreline Management Plan Review Appendix C)

http://www.ndascag.org/NDAS_SMP2_Summary_EMF_July2010_12082010.pdf (North Devon and Somerset Coastal Advisory Group (NDASCAG) Shoreline Management Plan Review (SMP2) Hartland Point to Anchor Head)
http://www.sdadcag.org/docs/html/frameset.htm (South Devon and Dorset Shoreline Management Plan)

1.2.6 Broad Character: Communications

1.2.6.1 Character Type: Transport

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The Character Type Transport relates to areas of coastally-specific, maritime-related infrastructure related to the physical movement of people and/or goods and includes the main physical communication methods - canal, railway, tramway, road, tunnel, bridge, civilian airfield.

The communications infrastructure in the South West is generally driven by two broad aspects: 1) serving needs generated within the region; and 2) serving needs beyond

the region, including transport to London, to the Midlands and the North, and to Wales. The locations established and routes taken are determined by complex factors including geographical and residential. The marked difference between the topography of the north and south coasts of the peninsula, with frequent long deep estuaries on the south coast offering ample opportunity for coastal trading and movement of goods by sea in contract to the rocky north coast with fewer harbours and more reliance on transport.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The South West contains evidence for some of the earliest routeways known in Western Europe in the form of the Neolithic and Bronze Age trackways of the Somerset Levels, and also, in the form of the Post Track and Sweet Track, some of the most securely dated, by dendrochronology, to 3838 BC and 3807/3806 BC respectively (Pollard and Healy eds 2008, 75). Later dryland routes have been preserved in the present as hollow ways or remodelled as part of the current road network as in, for instance, the Roman Fosse Way linking Exeter and Lincoln, still followed by sections of, amongst others, the A37 and the A367.

Historical routes, including those no longer extant, may be reconstructed via the locations of ferry crossings and fords, information about which may be available in documentary or archaeological form.

Perhaps the oldest of surviving structures relating to overland transport routes are the masonry bridges, many of which date to the medieval period. The Long Bridges at Bideford and Barnstaple, although greatly modified over the years, are good examples of bridges from this period (Bone and Dawson 2008, 224).

The state of roads in the South West was commented upon by many early travellers such as Celia Fiennes in 1695, 'Thence I went for Plymouth, 24 long miles, and here the roads contract and the lanes are exceedingly narrow…The ways become so difficult that one could scarcely pass by each other, even the single horses, and so dirty in many places, and just a track for one horse's feet, and the banks on either side so near..' (in Chope 1918, 117-8).

The turnpike trusts of the 18th century brought great improvements to longer routes and the South West could boast two of the earlier trusts, those of Bath (1707) and Bristol (1727). Most early road surfaces will have been replaced or overlain but associated road furniture such as tollhouses and milestones often do survive. The growth of the railways led to the end of the turnpike trusts but the rise of road traffic in the early 20th century saw the participation of central government in road building leading ultimately to the construction of motorways and bypasses in the later part of the 20th century. Associated feats of civil engineering accompanying this programme include the two Severn road bridges of 1966 (Listed Grade 1) and 1996, and the Tamar road crossing (Bone and Dawson 2008, 224-5). The main arterial routes in the region are the M4 and M5 and the A30/A303 and A38.

Improvements to the river network to allow increased traffic with a longer reach have played an important role in developing the trade networks of the South West, particularly so for Bristol where the River Avon was made navigable as far as Bath by 1727. The Wiltshire Avon was also made navigable as far as Salisbury in the late 17th century, although few traces of this remain.

The construction of canals was a natural progression of the river improvement schemes and the South West played an important role, not least with the construction of the UK's first two ship canals, Exeter in *c*1560 and Gloucester and Sharpness in 1827. Sharpness remains an important port and gateway to the Midlands. The region also contains important barge canals including the restored Kennet and Avon Canal and a network of canals in the Cotswolds. Topography restricted the construction of canals further west with the Bude Canal the only waterway still functioning (in part) of the three Cornish examples, whilst in Devon only short stretches of the Grand Western Canal and the Exeter Canal remain open. Many of the canals in the South West opened

just in time to be superseded by the railways in the middle of the 18th century (Bone and Dawson 2008, 225-6).

Fig 27 The old Severn Bridge viewed from Aust (©Copyright Barrie Jenkins and licensed for reuse under this Creative Commons Licence)

The South West has made a major contribution to the development of the nation's railway system, notably in the form of early mineral tramways in Gloucestershire, Dorset, Devon, and Cornwall, Brunel's pioneering main lines and associated engineering, particularly the Royal Albert Bridge over the Tamar, finished in 1859, and the construction of numerous picturesque branch lines throughout the region. Following the railway amalgamations of the 19th century three major companies operated in the South West, the Midland Railway which had a line to Bristol, the London and South Western Railway which operated from Waterloo to Exeter and beyond, and of course the Great Western Railway working west from Paddington (Bone and Dawson 2008, 226). The railways were extremely important for the development of mass tourism industry, as they opened up travel to the working class at an affordable price, as at Weymouth which was annually inundated with up to 6,000 workers from the Great Western Railways works in Swindon (Brodie *et al* 2008, 35-36).

The problems of crossing the Severn were solved by the Severn Bridge, completed in 1879 upstream of Lydney and Sharpness, and the Severn Tunnel, opened in 1886 after thirteen years of troubled construction. The former was damaged by two tanker barges in 1960 and never repaired, being dismantled in 1967; the latter continues in service today on the main line between Paddington and Wales. Many of the region's branch lines were closed as a result of the Beeching Report of 1963 and a large number of sections of these routes have returned to private ownership, either through sales or appropriation by adjacent landowners.

Ferries are one of the maritime-related transport characteristics of the South West: ferries to islands, such as Ilfracombe and Bideford to Lundy; foot ferries formerly across all estuaries, such as Helford in Cornwall; and car/foot ferries still common, especially on the south coast where they form road-links across estuaries, for instance the King Harry ferry across the River Fal in Cornwall.

Fig 28 King Harry ferry, Cornwall, late 19th century postcard

Freight and goods tramway transport have had a strong maritime-related presence in the South West, and the quarrying and mining tramways provided technological precursors for the region's later development of passenger tramways. From 1820, the Haytor Granite Tramway moved quarried granite from Dartmoor to barges on the Stover Canal for shipment from Teignmouth. Later passenger tramways were operated in Bristol, Bath, and Weston-Super-Mare from the late 19th century to the middle of the 20th. Few remains of these features survive. Several cliff railways are located in the South West, older 19th century examples at Lynmouth and Clifton Rocks, more recent features at Torquay and Bournemouth. These have proved popular with visitors not wishing to scale the steep cliffs by more traditional steps, paths, and roads (Bone and Dawson 2008, 226-7).

The main components are canals, railways, tramways, roads, tunnels, ferries, bridges and civilian airfields.

VALUES AND PERCEPTIONS

Cars generally travel to places where people used to walk, with regular travellers developing particular affection for the landscape/seascape views as well as accessibility, resulting in coastal caravan sites and golf courses and visitor service facilities, amongst others. Railways provide more leisurely and elevated views over the historic landscape/seascape.

Access to cars has significantly changed patterns of contemporary life, including the spread of out-of-town shopping and leisure centres, the decline of some local shops and the design of housing. Furthermore, road transport has revolutionised freight and distribution networks, with significant character impacts on ports, towns, and big-shed distribution depots in rural settings.

Canals are often seen as places of relaxation with the towpaths used as footpaths alongside which have sprung up many leisure facilities such as cafes, particularly on the Kennet and Avon Canal. Industrial use may continue on the Gloucester and Sharpness Canal but leisure activities are also encouraged here as elsewhere.

RESEARCH, AMENITY AND EDUCATION

The tourist industry's mark on the maritime-related character of present transport infrastructure is inescapable in the South West. Transport routes are largely facilitators for the appreciation of other parts of the historic landscape/seascape. They have considerable character impacts on the landscape/seascape, directly and indirectly through, for example, the establishment of new coastal settlements and trade. However, they also possess interesting features which are an expression of people's past activities. Bridges, viaducts, stations, roadside services and other infrastructure are also interesting elements which need to be contextualised within their regional landscape/seascape.

Much more useful research can be undertaken on early long distance routeways as the prehistoric trackways of the Somerset Levels are of international importance. Other trackways may await discovery on the Levels and in the intertidal zone and beyond.

Research on the region's railways has focussed on the 'locomotives, rolling stock and company history' in the 'steam age' (Bone and Dawson 2008, 227). However, scarce attention has been paid to 20th century railways in the period following the end of steam power. Furthermore, impacts on the seascape of new coastal roads are still awaiting assessment. The recording of related infrastructure of these transport routes, for example, bus shelters, petrol stations and road signage should also be taken in consideration. In general, it is only the earliest examples of such remains that have been researched or protected.

Consequently, this Character Type could be further explored through the way it takes people across the wider historic landscape/seascape (e.g. canal, railway and road features). In addition, many disused canals, tramways and railway lines offer routes for public access and enjoyment, some form part of the National Cycle Network, for instance the Mineral Tramways cycle route and the Camel Trail in Cornwall and the Tarka trail along the north Devon coast.

CONDITION AND FORCES FOR CHANGE

The railways continue to be important conduits for travellers, tourists and commuters, and, to a lesser extent, freight, despite the loss of many miles of branch line in the 1960s. Some routes have seen large increases in passenger numbers, perhaps partly due to concerns regarding travel by road, but also as new markets have opened. For example, the growth of Newquay as a domestic holiday destination for the young has seen passenger numbers rise by 30% between 2003 and 2009 (Office of Rail Regulation website).

New ferries in the Bristol Channel may persuade more people to leave their cars at home, or at least to make shorter journeys. If a proposed vehicle ferry across the Channel goes ahead (Severn Link website) significant reductions in motorway traffic between Exeter and Swansea may result. In addition, more people will have the opportunity to experience the landscapes/seascapes of the region from a different perspective.

The pressure to improve transport links for the many thousands of tourists who travel down to the South West's coastal resorts and beaches in the summer is a major force for change.

Rising sea levels as a result of climate change may have a considerable impact on coastal road and rail routes such as the main London-Penzance rail route at Dawlish, Devon. Considerable engineering may be required to continue using these resources safely, with consequent impacts upon historic landscapes/seascapes.

RARITY AND VULNERABILITY

Components of this Character Type are common; however, the ordinary nature of some of the surviving communication resource together with constant redevelopment means that this infrastructure is increasingly threatened.

PUBLISHED SOURCES

Bone, M and Dawson, D, eds, 2008. 'Post-Medieval, Industrial and Modern' in Webster, ed, 2008, 213-68

Cope, R P, 1918. *Early Tours in Devon and Cornwall*, reprinted in 1967 by David & Charles, Newton abbot

Pollard, J, and Healy, F, eds, 2008. Neolithic and Early Bronze Age in Webster, ed, 2008, 75-102

Thomas, D St J, and Smith, SR, 1973. *Summer Saturdays in the West*, Newton Abbot: David & Charles

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council

WEBSITES

http://www.severnlink.com/ (Severn Link)

http://www.severnsideforum.co.uk/severn%20tunnel.htm (Severnside Forum – The Severn Tunnel)

http://www.rail-reg.gov.uk/server/show/nav.1529 (Office of Rail Regulation – Station Usage)

1.2.6.2 Character Type: Telecommunications

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type covers telecommunications infrastructure across coastal land, inter-tidal and marine zones.

The South West has historically played an important part in the development and deployment of submarine cables and wireless communications. Cable stations are located where cables come ashore and the sites of pioneering wireless stations are located on the cliffs.

There are eight locations around the South West's coastline where submarine communication cables come ashore: Brean, Somerset (four transatlantic cables); Saunton, Devon (one transatlantic, two Western Europe – Spain and Portugal); Bude/Crooklets/Widemouth Bay, Cornwall (four transatlantic, one Northern Europe - Ireland); Lands End/Sennen/Skewjack, Cornwall (four transatlantic, one Northern Europe - Ireland); Porthcurno (one inter-regional, one transatlantic, two Northern Europe – Spain and Belgium); Goonhilly/Kennack Sands, Cornwall (one inter-regional, one transatlantic, three Northern Europe – Spain and Channel Islands); Pentewan (one transatlantic – but this section connects UK to France); and Dartmouth (two Northern Europe - Channel Islands).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The first submarine communications cables carried telegraphy (written communication) traffic. Later generations of cables carried first telephony (voice communication) traffic, and then data communications traffic. All modern cables use optical fibre technology to carry telephone traffic as well as Internet and private data traffic.

The first submarine cable laid in the region was an attempt to link Land's End with the Scillies in 1869, which failed before being successfully retried the following year. In the same year, 1870, Porthcurno was the location for the British end of a cable linking the UK with Bombay, India. By 1900 the Eastern Telegraph Company, later to become Cable and Wireless, operated a network of 100,000 miles of international cables linking the UK with the Empire and the rest of the world. The first cable to the Channel Islands was laid from Dartmouth in 1870.

Due to the unprecedented popularity of the internet and the development of e-commerce, cable numbers have grown throughout the South West linking the UK with mainland Europe, Ireland, and the Americas.

Overall, the submarine telecommunication cables in the region are modern impositions onto other Character Types; but the cables themselves, and their laying, are a part of the historic character which add to the previous character and become part of it in the present.

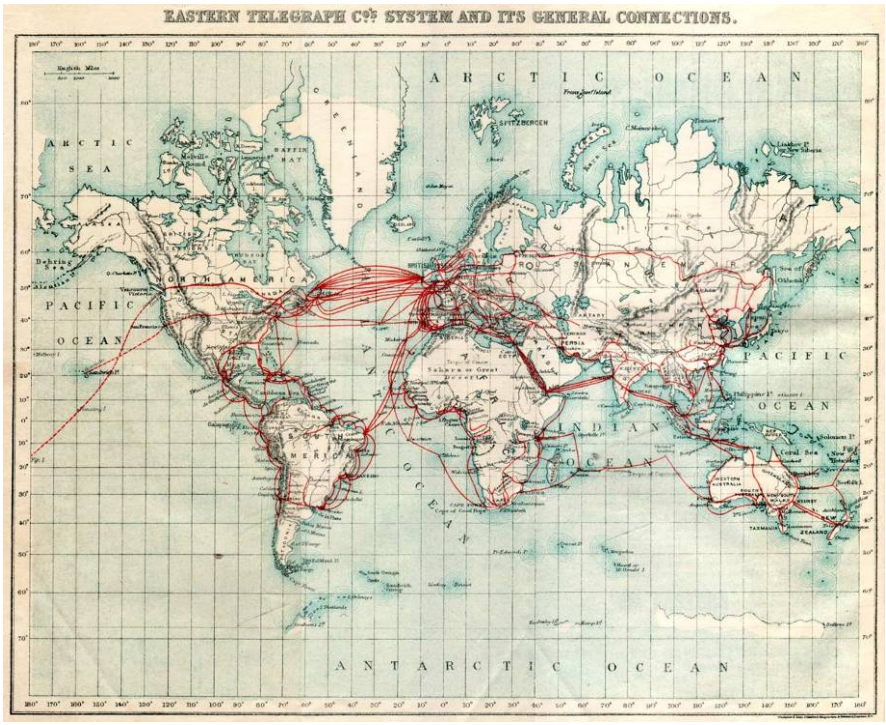

Fig 29 1901 Eastern Telegraph Company System Map (Reproduced from A.B.C. Telegraphic Code 5th Edition)

On 13 May 1897, the wireless pioneer Gugielmo Marconi sent the first ever wireless communication over open sea across the Bristol Channel from Lavernock Point in South Wales to Flat Holm, a distance of 6km. The message read 'Are you ready'. The receiving equipment was almost immediately relocated to Brean Down Fort on the Somerset coast, stretching the range to 16 km.

On 23 January 1901 Marconi sent the first wireless transmission over the horizon from the wireless station at Bass Point at the Lizard, Cornwall to the Isle of Wight. On 12 December 1901 he sent the first transatlantic transmission from the newly constructed experimental wireless station at Poldhu, also on the Lizard peninsula, to Signal Hill, St Johns, Newfoundland (Johns 2000).

The main components includes historic wireless and telegraph stations and their associated cabling, and civic listening devices. Modern cables also transfer mass media such as the Internet and telephone systems.

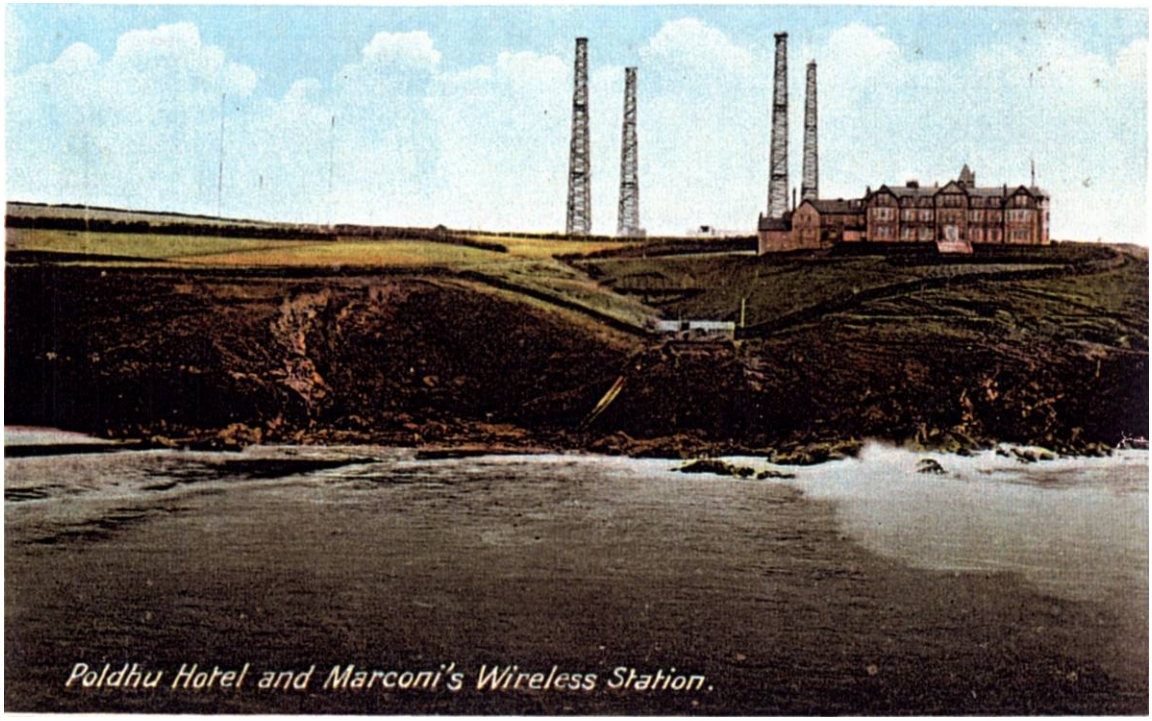

Fig 30 Post card of Marconi's wireless station at Poldhu, Cornwall

VALUES AND PERCEPTIONS

The presence of submarine telecommunication cables in the marine environment is likely to be largely unnoticed visually. However, their importance cannot be underestimated especially for those millions of internet and phone users.

The importance of the Marconi wireless station sites is widely recognised by professional historians and the general public.

RESEARCH, AMENITY AND EDUCATION

Works undertaken during cable laying and or maintenance may reveal further historic environment baseline data. Palaeoenvironmental evidence could be unearthed during such works, uncovering deposits rich in pollen taxa and macrofossils that can further inform our knowledge of the evolution of past environments, landscape/seascape and marine transgressions.

The submarine telecommunication cables provide the means to allow internet and phone access, opening up a varied range of educational and amenity tools accessible to the general public.

The need for submarine telecommunication cables and the logistics, practicalities and issues associated with their installation and maintenance provides an interesting cross-curricular educational case study. The Telegraph Museum at Porthcurno, Cornwall, situated in what was once the largest cable station in the world, is a valuable learning and resource centre. The Marconi wireless stations at the Lizard and Poldhu are both owned by the National Trust and open to the public, and used by local amateur radio groups. The Poldhu station has a popular visitor centre.

CONDITION AND FORCES FOR CHANGE

Offshore development affects the character of the landscape/seascape arising from preliminary survey work, laying and maintenance of cable, and removal of disused cables. Preparatory investigations may involve intrusive survey of the sea bed, disturbing and exposing archaeological deposits, but also providing detailed knowledge of seabed conditions. Cables are replaced fairly regularly as technology develops. Laying the cables involves burying them where they cross the foreshore and in shallow

waters, potentially disturbing other historic environment features. In deeper waters, submersible ploughs running on tracks or skis and towed by surface vessels are used for trenching, laying cable, and subsequent inspections.

RARITY AND VULNERABILITY

The laying of telecommunications cables is likely to increase; despite the increased use of satellites, transmission by this method has a much reduced capacity and greater latency in comparison to cables. However, the development of wireless technology may eventually lead to the redundancy of many of these cable routes.

PUBLISHED SOURCES

Johns, C, 1998. *The Lizard Wireless Station (Marconi Bungalow), The Lizard Cornwall: an archaeological survey*, Truro: Cornwall Archaeological Unit

Johns, C, 2000. *The Poldhu Wireless Station, Angrouse Cliff, Mullion, Cornwall: Archaeological Assessment*, Truro: Cornwall Archaeological Unit

WEBSITES

http://www.kis-orca.eu/map (Kingfisher Offshore Renewable and Cable Awareness)

http://en.wikipedia.org/wiki/Submarine_communication_cable (Wikipedia - Submarine communications cable)

http://www.kidorf.com/DBLandings.php (Kidorf Innovative Methods)

http://www.atlantic-cable.com/Cables/CableTimeLine/index1850.htm (History of the Atlantic Cable & Undersea Communications – Cable timeline)

http://www.porthcurno-telegraph-museum.org.uk/page.php?id=104 (Porthcurno Telegraph Museum)

http://en.wikipedia.org/wiki/Marconigram (Wikipedia entry for Guglielmo Marconi)

1.2.7 Broad Character: Military

1.2.7.1 Character Type: Military Defence and Fortification

This Character Type relates to defensive areas in coastal locations are designed to deter or prevent attack from seaward (ie by sea or air) although they may be locally oriented to defend against enemy troops attacking our coastal defences from landward too.

Military coastal defences can be found all around the South West coast. However, there is a tendency to find them densely concentrated around the main ports and harbours, in particular around Bristol, Falmouth, Plymouth, Portland, Weymouth, and St Mary's in the Isles of Scilly because ports were vulnerable areas for foreign attack.

This region is characterised by prehistoric forts, predominately now in rural areas, Roman forts, signal stations and harbours, medieval urban defences, and post-medieval and modern forts and batteries.

In general, prehistoric and Roman military defences are found on higher ground overlooking the coast or strategic river crossings, medieval defended sites are associated with urban centres, whilst later sites are usually to be found away from built-up areas with the exception of anti-aircraft installations around the major ports and cities.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The Bristol Channel and Severn Estuary has always been an important seaway and it is not surprising that fortified sites are present on the coasts edging it and the islands within it.

Cliff castles, or promontory forts, dating from the Iron Age are characteristic of the South West coastline. One of the earliest fortifications in the area is the Iron Age hillfort

on Brean Down, Somerset. Others include Countisbury Castle, Lynmouth and Hillsborough, Ilfracombe, both in Devon and the Rumps and Treryn Dinas in Cornwall.

Fig 31 The Rumps cliff castle, Cornwall. (Photograph; Cornwall Council.)

During the Roman period a greater degree of regionalised authority allowed a more coherent system of defences to emerge. The southern entrance to the Bristol Channel is marked by *Herculis Promontorium*, Hartland Point, or possibly Morte Point or Bull Point further east, as named in Ptolemy's Geography. The River Severn was called *Sabrina* (Rivet and Smith 1981, 372, 450-1).

The Roman military built forts at the head of several of the navigable estuaries and rivers including the Camel, Fowey, Tamar, Exe and Avon (Bristol) (Holbrook 2008, 160-1; Nowakowksi 2011).

During the post-Roman period there is evidence that many of the Iron Age hillforts in the South West were reoccupied, including Brent Knoll (Webster 2008a, 186). Also dating from this period are large linear earthworks such as the Wansdyke which runs south of the River Avon between Bristol, possibly from Stokeleigh Camp, and Bath and the southern section of Offa's Dyke which runs from the banks of the River Severn at Slimeroad Pill, Sedbury. These works indicate a period of warfare and strife but also a degree of political control necessary to undertake such immense tasks (Webster 2008a, 186).

Later, in Devon, Dorset and Somerset, a system of Alfredian *burhs* provided protection from Viking raids from the coast (at Bridport, Exeter, Halwell, Langport, Axbridge, Pilton in Devon and Watchet). One has also been identified at Athelney on the River Tone (Webster 2008a). At Watchet, Daw's castle was built in the reign of Alfred and modified during the reign of Aethelred II. The Anglo-Saxon Chronicle details a Viking raid at Watchet in 914 which was defeated 'with great slaughter ... so that few of them came away, except those only who swam out to the ships'. The town was raided again in 918, 977, 988, and 997. Other *burhs* listed in the Burghal Hidage of Alfred's son Edward the Elder include Pilton near Barnstaple, and Axbridge and Langport on the Somerset Levels. There is evidence that Gloucester may have been fortified in the same manner in the reign of Alfred's daughter Ethelfleda of Mercia in the early 10th century (Herbert 1988, 5-12).

The city of Bristol was established in Saxon times at the confluence of the rivers Avon and Frome. In 1088 the Normans built a castle to defend this important port city. At this time Bristol was the hub of trade with Ireland and was also used as a base for the invasion of that country in the 12th century (Rippon and Croft 2008, 201). Many of the troops were mustered at Gloucester and transported by river vessels to the embarkation point at Bristol. Gloucester was an important strategic point as a crossing point of the River Severn and the gateway to South Wales, fortified by the Normans, again initially with a motte and bailey later rebuilt in stone (Herbert 1988, 13-22).

Other Norman castles were constructed along the Bristol Channel shore including Barnstaple, a motte with shell keep and two baileys, and a fortified manor house was built on Lundy in the 12th century. At Tintagel on the north coast of Cornwall a castle was built in the mid-13th century by Richard, Earl of Cornwall on an earlier high status site (Thomas 1993).

The south coast of the region has many artillery forts and blockhouses built as part of Henry VIII's coastal defence policy in the late 1530s and 1540s. These include Pendennis and St Mawes castles defending the Carrick Roads, St Catherine's Castle defending the port of Fowey, the unfinished Harry's Walls on St Mary's, Isles of Scilly, and fortifications defending Weymouth Bay. Pendennis and St Mawes were two of the ten great 'castles' built by Henry (Saunders 1989, 37).

Fig 32 St Mawes Castle, Cornwall. (Photograph; Cornwall Council.)

Coastal defences in the region were further enhanced following a review by Sir Walter Raleigh in the wake of the Spanish Armada in 1588; these include the bastioned enceinte at Pendennis Castle and Star Castle on St Mary's, Isles of Scilly.

The English Civil War (1642-47) saw the next major phase of fortifications; these were often hastily constructed earthen redoubts, bastions and breastworks, for defence or laying siege. The Civil War defences in the Isles of Scilly are exceptionally well preserved as are those on Lundy. Bristol was a key site in the Civil War and the series of sieges it underwent are well documented. Parts of the defences survive, others have been recorded archaeologically (Bone and Dawson 2008, 245).

Military fortifications were constructed and improved during the 18th and 19th centuries in response to perceived threats during a series of wars. These included the continental wars of the early 18th century, the Seven Years War in the 1750s, the War of American

Independence from 1775-83, the French Revolutionary War of the 1790s, and the Napoleonic War of 1803-15. Invasion scares occurred in the mid-1840s and again in 1858-9. An escalating arms race in the later part of the 19th century, first with France, then with Germany, led to further modifications of fortifications and batteries (Bone and Dawson 2008, 246). In the South West region, the major surviving expression of the defences of this period is the massive fortifications defending Plymouth and its approaches (Pye and Woodward 1996).

For the fifty years prior to the World War One (WW1), Britain's defences had been concentrated on the protection of her naval bases, given that the main defence of the country was considered to rest in the Royal Navy. Military structures were confined largely within the ports and the garrison towns, although some fortification of vulnerable expanses of coastline was carried out. The army served principally overseas in the protection of the Empire. In this respect Plymouth and Portland have impressive arrangements of multiple defences dating to successive periods in the 19th and early 20th centuries (Pye and Woodward 1996).

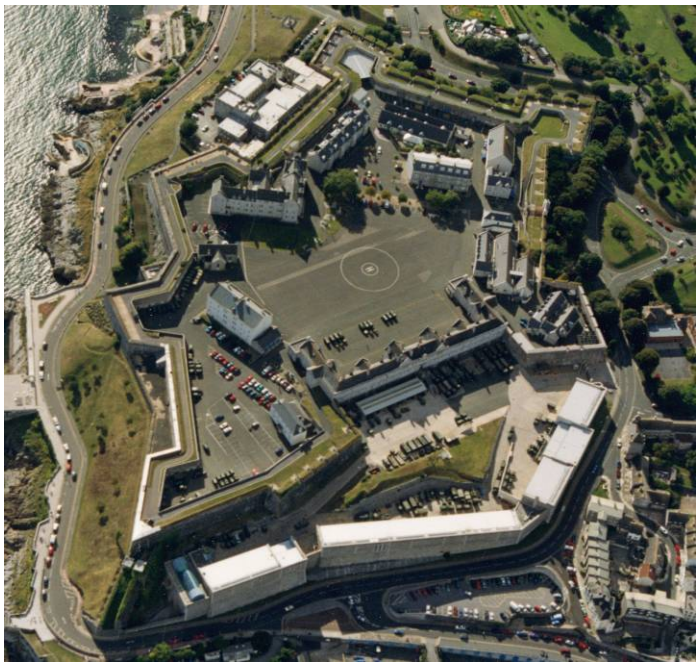

Fig 33 Plymouth citadel. (Photograph; Cornwall Council.)

During WW1 (1914 to 1918) the South West escaped the naval bombardments and aerial attacks suffered by the east coast of Britain. Instead, military operations were confined to attacks against German naval forces and, in particular, to keeping the United Kingdom's supply routes open. Few remains associated with this period are documented within the Bristol Channel which came under the Cardiff Subcommand of the Western Approaches Command of the Royal Navy (Bone and Dawson 2008, 251).

At the onset of World War Two (WW2) Britain was ill-prepared to defend against an expected invasion by Germany, the result being a government policy that was to turn Britain into a fortress. The War Office deduced that the Germans would attempt a landing in the south and south-east of England, but nearly the whole of Britain was fortified to counter possible major diversionary raids elsewhere. Many beaches were made impenetrable with scaffolding was to obstruct landing craft, minefields, barbed wire, anti-tank defences and pillboxes. Many existing fortifications were upgraded during the war and the South West became a major mustering point for the D-Day landings in 1944.

By 1956 a complete review of Britain's defence policy had been carried out and coastal defence was finally abolished in that year. Some sites have been statutorily protected

as historic monuments but many have been abandoned, sold for new development or levelled (Saunders 1989, 225).

The Character Type also includes naval battlefields of which the South West has several important events: The Spanish Armada of 1588 was engaged off Plymouth and then Portland Bill, and in the First Anglo-Dutch War in the late 17th century two battles were again fought off Plymouth and Portland, the latter lasting three days and restoring English supremacy in the Channel. Two naval battles were also fought off Lizard Point, Cornwall; in 1637 the Dutch and Spanish fought and in 1707 two French squadrons attacked a large English convoy inflicting a major victory with the capture of dozens merchant vessels.

In World War Two the offshore area of the Atlantic was a significant battle ground with numerous engagements scattered across its area. The Battle of the Atlantic was the longest military campaign in the War, reaching its height from mid 1940 through to the end of 1943. U-boats and other warships of the *Kreigsmarine* (German Navy) and aircraft of the *Luftwaffe* (German air force) battled against the Allied navies and air forces supporting convoys of merchant ships bringing supplies from North America to the United Kingdom and the Soviet Union.

The South West also played a pivotal role in the latter part of World War Two as the main embarkation point for the D-Day landings. The build up included the stationing of huge numbers of troops, military exercises (for example the ill-fated Operation Tiger at Slapton Sands), air support, and the creation of embarkation hards especially in the main estuaries – the Helford, Fal, Tamar and Dart. Ports such as Portland, Weymouth, Dartmouth, Plymouth and Falmouth also played an important role as major embarkation points.

Typical components of this Character Type can include: anti-tank defences, artillery, fortifications, anti-landing features, batteries and gun emplacements, castles and forts. moats and dikes, town walls and gates, minefields, pillboxes, battlefields and sites of battles, naval warships, submarines (including wrecks) and military aircraft crash sites. Individual defensive sites, such as anti-landing defences, concrete pillboxes and decoy sites are often components within more complex arrangements of built and fieldwork fortifications tailored to the landscape form and designed to protect strategic areas. During WW1 the Defence of the Realm Act 1914 enabled vast tracts of land to be requisitioned for camps, airfields, munitions production, and storage. At the outbreak of the WW2 in 1939 a similar Act was passed, the Emergency Powers (Defence) Act 1939, and coastal defences were greatly extended.

VALUES AND PERCEPTIONS

Defensive works of prehistoric, Roman, medieval, and post-medieval date are widely valued as reflecting important tangible evidence for the region's role in former military campaigns, defences, and strategy. Many are designated by Scheduling or Listing and those that are not will mostly be recorded in county HERs and SMRs and subject to planning conditions in the face of proposed developments.

In the case of more recent concrete-built military works, both public and official opinion has now largely turned against the idea that they are an eyesore and an inconvenience in the landscape to be removed without consultation wherever possible. Now, they tend to be seen as part of the overall historic legacy of the landscape, and, in the case of WWII, of particular significance in terms of their place in the front line of the region's wartime experience.

RESEARCH, AMENITY AND EDUCATION

Although some sites are on private property, a number of military sites are accessible to the public and castles and other fortifications along the South West Coast Path as points of attraction for tourism and educational initiative for example: Tintagel, Pendennis and St Mawes Castles on the Cornish coast.

Many of the earlier military features on the shores of South West have been the subject of previous studies and excavations; more recent work tends to have been development led.

The military remains of WW1 and WW2 have been one of the most active areas of research for special interest groups in recent years. The larger coastal defence batteries from WWI are well known, although there has been less work on the more ephemeral remains from 1914-18, such as practice trenches, early industrial sites and damage from enemy action. In general, the remains of the 1939-45 conflict have attracted the greatest interest, reflecting both the greater number of surviving features and the fact that action is still within living memory of some members of the population. A result of an increased public interest in surviving military remains was the Defence of Britain Project (DOB; 1995-2002), which ran under the auspices of the Council for British Archaeology.

There is now a growing business in 'heritage tours' focussing on archaeological landscapes and features in the region, which strongly bring in military coastal defences from all periods.

CONDITION AND FORCES FOR CHANGE

Many of the military remains on the shores of South West are subject to the forces of coastal erosion, which may be exacerbated by future rises in sea level. However, many of these fortifications are protected through Scheduling and Listing.

Military remains from WWI are a fast disappearing resource. Although events from this war may not have had the same impact on the region's environment as those of WWII, there are still many surviving remains, ranging from coastal batteries, to rifle ranges and practice trenches, but these features are often ephemeral, and in many cases their origins have been forgotten.

Along the beaches and scattered through the dune systems there are still the remains of many of the WWII pill boxes and gun emplacements. Sadly, many of these are suffering from the effects of time, neglect and vandalism, from loss to coastal erosion, and still, occasionally, loss by deliberate destruction, the two pillboxes at Talland Bay near Looe, for example, were broken up in *c*2002 and still lie thee as mounds of rubble with projecting reinforcing scrap-iron.

RARITY AND VULNERABILITY

The Defence of Britain Project (DOB) highlights that there are still many examples that survive in good condition, arguing for their preservation for their historic and unique importance as well as for their educational potential (Defence of Britain website). Many defence structures that have good public access could be enhanced by appropriately positioned information boards, and incorporated into 'heritage walks', so that their place in history can be understood more comprehensively. This would also be in line with the provisions made to improve open air recreation on foot to the English coast under the Marine and Coastal Access Act 2009.

PUBLISHED SOURCES

Barratt, J, 2005. *The Civil War in the South-West*, Barnsley: Pen and Sword Military

Bone, M, and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in Webster, ed, 2008, 213-68

Foot, W, 2000. Landscape of War, *British Archaeology*

Herbert, N M, ed, 1988. *A History of the County of Gloucester: Volume 4 The City of Gloucester*, Victoria County History.

Holbrook, N, ed, 2008. Roman in Webster, ed, 2008, 151-62

Latimer, J, 1900. *Annals of Bristol in the Seventeenth Century*, Bristol: William George and Sons

Mason, D J P, 2003. *Roman Britain and the Roman Navy*, Stroud: Tempus

Murray, J, 1879. *A handbook for travellers in Devonshire*

Nowakowski, J A, 2011. Appraising the bigger pictutre — Cornish Iron Age and Romano-British lives and settlements 25 years on, *Cornish Archaeology* **50**, 241-261

Pye, A, and Woodward, F, 1996. *The Historic Defences of Plymouth*, Exeter Archaeology and Fortress Study Group South West

Rippon, S, and Croft, B, eds, 2008. Post-Conquest Medieval, in Webster, ed, 2008, 195-208

Rivet, A L F, and Smith, C, 1981. *The Placenames of Roman Britain*, University Press, Cambridge

Saunders, A, 1989. *Fortress Britain: artillery fortifications in the British isles and Ireland*, Beaufort Publishing Ltd, Liphook

Thomas, A C, 1993. *Tintagel, Arthur and Archaeology,* London: Batsford / English Heritage

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework Resource Assessment and Research Agenda*, Taunton: Somerset County Council

Webster, C J, 2008a. 'Early Medieval' in Webster, ed, 2008, 169-188

White, R, 2007. *Britannia Prima, Britain's last Roman Province*, Stroud: Tempus

WEBSITES

http://www.archaeologyuk.org/cba/projects/dob (Defence of Britain)

http://omacl.org/Anglo/ (Anglo-Saxon Chronicle)

http://www.about-bristol.co.uk/old-00.asp (Bristol - history of the old city)

http://www.british-history.ac.uk/report.aspx?compid=42268 (Anglo-Saxon Gloucester)

http://en.wikipedia.org/wiki/Bristol#History (Bristol – Wikipedia)

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69626/pb13855-marine-coastal-access.pdf (Marine and Coastal Access Act 2009)

1.2.7.2 Character Type: Military Facility

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type covers a broad range of areas and sites intimately connected with military activity but ancillary to the locations of defensive or offensive activity themselves. For example it includes training areas and establishments, barracks, repair and maintenance areas, and bases and airfields.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Much of this character type in the region is concerned with naval facilities. Early naval shipbuilding in the region is recorded at Cone Pill near Lydney on the Severn where frigates were built until 1646 (Mullin *et al* 2009, 25).

Formal naval facilities were established at Devonport in the 1690s with the construction of the dockyard. The yard expanded throughout the 18th and 19th centuries, becoming, with Portsmouth, one of the two largest naval bases in the country. In addition to the dockyard, facilities included a watering point, victualling stations, hospitals, gunpowder mills, and powder magazines. These were dispersed throughout Plymouth Sound (Bone and Dawson 2008, 246).

At Dartmouth, although there is evidence of earlier dock facilities, it was the activities of an ambitious politician, John Seale, attempting to obtain favour with the Admiralty in his attempt to win a parliamentary seat, which boosted shipbuilding in the town. A dry dock complex to equal any Plymouth could boast was built at Sandquay, completed in 1793. The facilities comprised a number of slips, a small wet dock, a dry dock served by a boiler house and a Newcomen steam engine, and associated offices and workshops. This yard was then used to undertake naval work including repairs and the construction of new naval vessels. The Navy took over the yard in 1885 after a period of stagnation (Smart 2001).

In the 20th century the Royal Navy commands responsible for the region comprised the Portland Subcommand of the Portsmouth Command and the Devonport, Falmouth, and Cardiff Subcommands of the Western Approaches Command. The Bristol Channel came under the Cardiff Subcommand. Knowledge of the survival of structures associated with these command centres is sparse: hopefully this will be rectified by a proposed English Heritage-commissioned study (Bone and Dawson 2008, 251).

Present command centres include the Royal Naval base at Devonport and the headquarters of the Special Boat Service at Poole.

Fig 34 St Eval WW2 airfield, Cornwall. (Photograph; Cornwall Council.)

World War One (WW1) flying boat stations were established at Newlyn, Cornwall, and Tresco, Isles of Scilly, with the very limited remains of associated features still extant at both sites.

World War Two (WW2) saw the construction of many coastal airfields such as St Eval, Predannack and Perranporth in Cornwall, and a major increase in the importance of naval aircraft, for reconnaissance, air-sea rescue of the survivors of sunken ships and downed aircraft, and for offensive operations against, in particular, the German U-Boats. Flying boat stations were located at Poole and Mount Batten, Plymouth whilst Fleet Air Arm stations were located at Culdrose and St Merryn in Cornwall and Yeovilton and Henstridge near Yeovil, and Chivenor in North Devon (Bone and Dawson 2008, 255). The latter is a Royal Marines base as well as the home of an RAF search and rescue flight, whilst Culdrose and Yeovilton are the only two remaining naval air stations in the country.

Portland Harbour was an important military practice area and testing ground for torpedoes from the late 19th century until the WW2, and after the war also as a place for research into underwater detection. This included the development of a purpose built research centre in the 1950s at Southwell, on the south western edge of the Island of Portland. This has now closed and been redeveloped as a business park (Jurassic Agent website).There are several military firing and training ranges in the region, principally at Lulworth and Wyke Regis, Dorset, Fremington and Braunton Burrows on the Taw Estuary, and the Antony Training Area on the Rame Peninsula, South Cornwall.

Due to its high concentration of naval bases and offshore waters, the South West also has a high number of inshore and offshore military practice areas. Many of the practice areas are only used occasionally, and for the most distant offshore areas in the South West they can constitute the only clearly defined active sea use.

Typical components of this Type include barracks, firing range (land), military airfield, military base, ordnance dumping, military practice area, naval dockyard, naval firing range.

VALUES AND PERCEPTIONS

This Character Type controls specific areas across the region, dominating the landscape physically (through warning signs and security devices like fences) as well as psychologically.

From a sea perspective, the components of this Character Type may be perceived as 'not being there' due to the lack of visible features and/or boundaries.

RESEARCH, AMENITY AND EDUCATION

This Character Type contributes to landscape character disproportionately due to its scale and has considerable research and amenity potential once installations are decommissioned. Close consultations on decommissioning these places would ensure the best possible reuse of these complexes. MoD landscape managers could inform on the history of the regional military bases.

Portland contains a high concentration of interesting and potentially important former military facilities, many of which have been decommissioned, and whilst some have already redeveloped or removed, many others await redevelopment e.g. Portland's naval hospital. It is highly likely that several of the sites are important in terms of understanding Britain's military development in the 20th century and the Cold War, for example the development of torpedoes, however, at present there is no over-arching study. There is also considerable potential for involving the local community and businesses in a landscape based assessment which could identify areas and sites to improve amenity and education opportunities.

Some military facilities have been converted into museums, for example, RNAS Yeovilton hosts the Fleet Air Arm Museum.

CONDITION AND FORCES FOR CHANGE

Unless re-using former military sites, the evidence for time-depth is confined to features such as hedges and tracks captured within secure fencing.

The impact of military activity on the landscape/seascape in the region is linked to the level of use. Direct impacts are a product of construction and operations, such as the use of tracked vehicles, trench digging and explosions. These activities can cause the removal, disturbance or exposure of prehistoric and historic remains. Artillery and bombing ranges could also have a significant impact on the inter-tidal and sub-tidal zones.

The military sites in the area surrounding Portland Harbour are areas of potential redevelopment especially those that were formerly used by the Royal Navy into the 1990s. It is likely that there will be further redevelopment and investment into the area

surrounding Portland Harbour and it is important that there is a good understanding of the historic environment to help guide and support change.

RARITY AND VULNERABILITY

As working installations, mainly with few earlier features or components, they survive well, but as military installations have become more centralised, they have become rarer.

PUBLISHED SOURCES

Bone, M and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in C J, Webster, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework Resource Assessment and Research Agenda*, Taunton: Somerset County Council

Mullin, D, Brunning, R, and Chadwick, A, 2009. *Severn Estuary Rapid Coastal Zone Assessment Survey*, Phase 1 report, English Heritage

Smart, I H, 2001. The Shipyards Of Dartmouth Sandquay Dockyard (The Dartmouth Harbour Papers Part 6), *Maritime Southwest* **14**

WEBSITES

http://www.jurassicagent.co.uk/index.php/library/history/deadly-weapons/55-underwater-research (Jurassic Agent website - Portland Harbour underwater research)

http://www.britarch.ac.uk/projects/dob/review/index.html (Council for British Archaeology, Defence of Britain project)

http://thesaurus.english-heritage.org.uk (English Heritage Thesauri for terminology and definitions)

1.2.8 Broad Character: Settlement

1.2.8.1 Character Type: Settlement

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type relates to contiguous areas dominated by built structures serving various human activities including habitation. The range of activities beyond habitation, and extent of associated infrastructure, varies considerably.

The settlements along the South West's coastline are varied, ranging from one of England's largest cities, Bristol, through large naval and civilian ports such as Plymouth and Falmouth, seaside resorts such as Weston-Super-Mare, Newquay and Weymouth, fishing ports such as Newlyn and Brixham, commercial ports both contemporary (Avonmouth and Portland) and historic (Charlestown and Par), and smaller fishing villages such as Clovelly, Port Isaac, and Portloe.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Coastal settlements in prehistory will have been established to exploit coastal resources and, later, to control trade routes and take advantage of sheltered landing sites. Prior to the Iron Age, settlement will have been largely dispersed, consisting of family farming and fishing communities with some larger settlements such as Trethellan, Newquay where the remains of seven buildings overlooking the Gannel Estuary were excavated (Nowakowski 1991).

Fig 35 Reconstruction of a prehistoric settlement at Chacewater near Truro. (Photograph; Cornwall Council)

Evidence for larger settlements increases at the beginning of the Iron Age, for example, Mount Batten, a sheltered promontory in Plymouth Sound, where there evidence for a sudden growth in metalworking and trade with Cornwall, Dorset, and Brittany from the 8th century BC (Cunliffe 1988). Trading settlements were also established at Hengistbury Head and Poole Harbour towards the end of the first millennium BC. These sites are all considered to be examples of *oppida* or towns. On the Somerset Levels, Glastonbury Lake Village, occupied between 300 BC and AD 100, contained over 80 structures built on a foundation of tree trunks and surrounded by a palisade and open water. Perhaps up to 15 of these structures would have been occupied at any one time (Coles and Coles 1989; Fitzpatrick ed 2008).

During the Roman occupation Poole Harbour continued to be a major civilian port (Mason 2003, 116). Major urban centres with maritime links were created with the establishment of a *civitas* at Exeter and a *colonia* at Gloucester, both on the site of legionary fortresses. Both of these towns had substantial outer stone walls added in the later Roman period, expanding their area, but despite this the archaeological evidence shows that economic activity appears to have contracted. This may have been the result of disruption to maritime trade routes caused by piracy and/or political upheavals (Ottaway 1992). A smaller town existed at the military port of Sea Mills and there are grounds for believing the recently rediscovered Roman fort at Lostwithiel may have developed as, at least partially, a civilian centre following initial military occupation (Thorpe 2007).

Smaller native settlements with less infrastructure will have existed around the coast. Larger examples of these Romano-British settlements can be found at Portishead, Clevedon, Weston-Super-Mare, Combwich, and Crandon Bridge on the shores of the Severn Estuary. The latter is the only site to have been extensively investigated archaeologically and these investigations have revealed paved and cobbled areas, stone buildings, stone walls, and considerable amounts of imported pottery and coins (Rippon 2008).

Further west, an example of a coastal native settlement can be found at Lellizzick, at the mouth of the Camel Estuary in Cornwall, where a multi-phase, Roman–period

settlement consisting of up to 70 circular structures, shows evidence of continual trade with continental Europe (Wessex Archaeology 2008).

Similar arrangements would have occurred at nearby Tintagel during the Post Roman period, where there is evidence of substantial trade with Mediterranean Europe. A little further down the coast, at Mawgan Porth, a later farming settlement of 10th and 11th century date heralds the appearance of the long-house in the local architecture (Preston-Jones and Rose 1986).

The first towns in South West England began to appear in the 7th and 8th centuries when settlement and centralized political control became more established. Further south-west this process was delayed somewhat and it is not until the late 9th century that there is evidence for the re-establishment of urban life at Exeter (Webster 2008, 173). By 1086 the city had become one of the ten largest towns in England, the Domesday survey recording 399 houses and a population of around 2000. Its major sources of income were trade, particularly in cloth, and its role as the paramount administrative and church centre in the far west (Rippon and Croft 2008, 199).

Smaller settlements belonging to a system of Alfredian defended 'burhs' provided protection from Viking raids along the coast an there is evidence that Gloucester may have been fortified in the same manner as the Wessex *burhs* in the reign of Alfred's daughter Ethelfleda of Mercia in the early 10th century. Gloucester was a Saxon town following its capture in 577 and hosted the site of a royal palace at Kingsholm, possibly as early as 896 (Herbert 1988, 5-12).

The city of Bristol was established in the Saxon period at the confluence of the rivers Avon and Frome, the settlement was known as Brycgstow, 'the place at the bridge', and is first mentioned in the Anglo Saxon Chronicle in 1051 (Aughton 2000, 6). The Normans built a castle to defend this important port and by 1200 the town had developed into a major centre (Rippon and Croft 2008, 201). William of Malmesbury, writing in 1125, was able to describe it as a place 'where there is harbour able to receive ships coming from Ireland, Norway and other lands overseas: thus a region so blessed with home-grown riches need not go without traffic in foreign wealth' (Winterbottom ed 2007, 447). By the medieval period Bristol was cosmopolitan port enjoying considerable contacts with both its surrounding area and with continental Europe. The growth of Bristol seems to have suppressed the establishment of towns in the north of Somerset but the period after the Norman Conquest saw several new towns established further south, including the port of Bridgwater. A similar pattern is repeated in Gloucestershire with the establishment of large numbers of small market towns (Rippon and Croft 2008, 201-2).

Plymouth developed into a town in the 13th century from its origins as the small fishing village of Sutton. The growth of the town appears to be a direct result of the silting up of the Plym, probably the result of streamworking, rendering the port of Plympton unusable for maritime vessels. This pattern was repeated later throughout the far west as the working of ground for tin upstream considerably altered the fortunes of some port towns on the estuaries of west Devon and Cornwall: as estuaries silted up many became cut off beyond the reaches of the tide and their formerly vibrant economies often stalled. Examples include Tregony and the stannary towns of Helston and Lostwithiel. Plymouth, on the other hand, continued to expand, in the process incorporating neighbouring settlements (Rippon and Croft 2008, 199-201).

The pattern of settlement in much of Devon and Cornwall during this period was one of emerging small market towns, several of which developed in coastal locations in response to an increase in maritime trade and fishing. Examples from Cornwall include Padstow, St Ives, Penzance, Penryn, Fowey, and Looe (Rippon and Croft 2008, 198). Many smaller fishing settlements associated with the Cornish place-name element *porth*, landing place, sprang up around the coast, including Port Isaac, Port Quin, Porthgwarra, and Portholland.

In the post-medieval period rural settlement continued in much the same pattern as that established in the medieval; any new settlements were generally the result of enclosure of marginal land. An important catalyst for new settlement development, particularly in the mining areas of Cornwall and the coalfields of north Somerset and Gloucestershire was industrialisation. These were primarily in areas of production but several new port towns, amongst them Portreath, Charlestown, and Par, were created to facilitate the export of materials. Developments in transport also led to the creation of settlements, as occurred at Sharpness on the Severn following the construction of the Gloucester and Sharpness Canal (Rippon and Croft 2008, 220-1).

Urban centres in the South West experienced a period of growth during the 16th and 17th centuries, particularly at Bristol, Exeter, and Gloucester. The ports of these towns gave them an advantage and their positions as 'nodal points in the increasingly complex transport networks' gave them 'access to raw materials, labour, and markets'. In the centres of the towns medieval forms gave way to extensive rebuilding in the 17th century in brick and pantile in streets, followed by terraces and squares in the 18th century (Bone and Dawson 2008, 221-3).

A new town was established at Falmouth following a suggestion from Sir Walter Raleigh that the site, defended by Pendennis and St Mawes Castles, would make an excellent victualling centre. James I authorised the establishment of four inns in 1613 and by 1627 the inhabitants of the new settlement numbered over 300. A charter for the new town was granted in 1661 and, from an initial reliance on fishing and victualling, Falmouth became involved in shipbuilding and international trade following the opening of customs facilities. It had grown to be the largest town in Cornwall by the end of the 18th century (Ratcliffe 1997, 37).

Devonport originated as a new naval dockyard commissioned by William III and opened in 1695. It was originally called Plymouth Dock but by 1823 it had grown to be larger than nearby Plymouth and residents petitioned George IV to have the name changed to Devonport. The town was merged with Plymouth and Stonehouse to form the Borough of Plymouth in 1914 which subsequently gained city status in 1928 (Wikipedia).

The seaside resort came into being in the 18th and 19th centuries as the Romantic movement occasioned a change in the perception of, and attitudes towards, the coast. Towns such as Exmouth, Sidmouth, and Weymouth were early resorts and provided an opportunity for innovative town planning including crescents, squares, and terraces, expanding out from more haphazardly arranged existing coastal settlements. Later 19th century designs included the construction of villas at coastal towns such as Torquay (Bone and Dawson 2008, 221). Newquay developed much later, with tourism becoming the main industry in the late 19th century, stimulated by the construction of several large hotels designed by the Silvanus Trevail who believed that tourism could enhance the Cornish economy after the decline of the mining industry (Newell 2003). Many of these towns went into decline in the later 20th century as cheap flights to warmer climates deprived them of their mass tourism base but several are reinventing themselves for new markets.

The 20th century saw the movement of industry away from city and town centres to the outskirts of urban areas. At the same time improving transport links allowed settlement to disperse into suburbs surrounding the major centres. The trend towards land-hungry semi-detached housing at the expense of terraced has seen ever more greenfield sites disappear. Planned zoning of urban areas has driven their development and, in some cases, has given rise to some unusually shaped settlements as at Bridgwater where growth has been constrained by mineral extraction licenses. Before the advent the Town and Country Planning Acts extensive development had been on a field by field basis and long extinguished field patterns can be traced in the layouts of developments (Bone and Dawson 2008, 221-4). A major factor in the development of settlements in the latter part of the 20th century has been the rise in road traffic, creating ever-more demand for road schemes, but again their benefits and their effects on communities and townscapes are highly contested.

Many formerly working commercial, industrial, and fishing ports have become primarily residential and increasingly focussed on the tourist industry. A rise in the demand for tourist accommodation, second home ownership, and housing for wealthy urbanites has led to the expansion of social housing and cheaper residential housing on the outskirts of many of the more picturesque coastal towns and villages of the region, often housing those who now service the tourist industry and surviving traditional occupations in those settlements.

Fig 36 Reuse of warehousing in Totnes with the conversion to residential properties. (Photograph; Cornwall Council.)

Typical components of this Character Type include roads and trackways, enclosures, field systems, boundary banks and ditches, ponds, parks and woods, mills, and manor houses, moats and churches, amongst others.

VALUES AND PERCEPTIONS

The coastal settlements of the South West are many and varied. Cities such as Bristol and Plymouth have seen periods of decline with the shrinkage of their core industries but have managed to reinvent themselves to some degree, offering retail, entertainment, and heritage attractions. Former fishing and industrial ports are valued by locals and tourists alike as picturesque locations full of architectural gems and seaside resorts are enjoying a small but significant renaissance. A few towns, such as Ilfracombe, Newlyn, and Brixham, continue to have a thriving fishing industry.

Most of the region's coastal towns contain numerous Listed Buildings and Conservation Areas, usually in the historic cores. Local Plans reinforce these planning controls and most Conservation Areas are being recorded, characterised and provided with Conservation Area Appraisals. Many settlements will also fall within the broader designations of Area of Natural Beauty (AONB) and Area of Great Landscape Value (AGLV).

RESEARCH, AMENITY AND EDUCATION

Some coastal towns and villages are important elements of the South West's tourist industry, often as seaside resorts or refuges on rainy days. Many have iconic historic features (e.g. churches, castles, and bridges) which are displayed to visitors and some

have interpretative leaflets or booklets to guide people around. Less public understanding is conveyed about the broader evidence of those settlements' historic development, in aspects such as their layout, street plans and varied building widths. There is, however, considerable potential for outreach and public awareness initiatives to further promote the unique and shared past that most towns have. This can be aimed at towns' inhabitants, particularly children, and visitors, increasing peoples' awareness of the historic aspects of their homes.

Towns and villages are generally highly-valued features of the landscape, having a wealth and great variety of historical and archaeological components, demonstrating considerable time-depth and contributing strongly to the appearance and character of the South West. There is considerable potential for further archaeological and historical research, as well as the development of education and outreach initiatives, getting across the broader historical dimension of the regions' present settlements' overall expressions beyond their individual components. This can expand and build on existing work such as that of the Cornwall and Scilly Urban Survey (see Newell 2003 for example) or English Heritage's guide to Weymouth's Seaside Heritage (Brodie *et al* 2008).

CONDITION AND FORCES FOR CHANGE

Although settlements, as hubs of human activities, go through continuous change, the layouts and historic fabric of most of them display their long historical development relatively well. However, extensive bomb damage was sustained by Bristol, Exeter and, in particular, Plymouth during World War Two. That has dramatically changed much of its former character, replaced by open boulevards and modern shop fronts. Small areas of the town, such as the Barbican on the western side of Sutton Harbour, have areas of surviving period buildings and street layout and a taste of what has been lost of pre-war Plymouth can still be found here.

It is likely that subsurface remains are well preserved where settlement layouts have suffered little change. In general, rural settlements are also well preserved in the South West, with modern developments usually seen as lateral expansions (rather than replacements) from an historic core.

The survival of street plans in most towns provides a valuable insight into the organisation and development of those towns. However, the character of some towns is being fundamentally changed by the construction of new housing, often in the form of estates with almost identical houses whose character does not always appear to accord with that of their locality or even region.

RARITY AND VULNERABILITY

There are many towns and villages throughout the South West but few large cities. All are vulnerable to development pressures for housing, commerce and industry. The character of many settlements is being most fundamentally changed by the construction of edge of town supermarkets and new housing, often in the form of estates of virtually identical houses.

Rural settlements are vulnerable to conversions from agricultural or industrial to purely residential accommodation. Their change in character could be attributable in some cases to the creation of mini-suburbs in the countryside. Local communities in small coastal settlements can be displaced by 'incomers' and second home owners.

PUBLISHED SOURCES

Haughton, P, 2000. *Bristol: a people's history*, Lancaster: Carnegie

Bone, M, and Dawson, D, eds, 2008. 'Post-Medieval, Industrial and Modern' in Webster, ed, 2008, 213-68

Brodie, A, Ellis, C, Stuart, D, and Winter, G, 2008. *Weymouth's Seaside Heritage*, English Heritage

Coles, B, and Coles, J, 1989. *People of the wetlands, bogs, bodies and lake-dwellers*, London: Guild Publishing

Cunliffe, B, 1988. *Mount Batten Plymouth. A prehistoric and Roman port*, Oxford

Fitzpatrick, A, ed, 2008. Later Bronze Age and Iron Age in Webster, ed, 2008, 117-148

Friel, I, 2003. *Maritime History of Britain and Ireland*. London: The British Museum Press

Herbert, N M, ed, 1988. *A History of the County of Gloucester: Volume 4 The City of Gloucester*, Victoria County History

Mason, D J P, 2003. *Roman Britain and the Roman Navy*, Stroud: Tempus

Newell, K, 2003. *Newquay*, *Cornwall and Scilly Urban Survey*, Truro: Cornwall County Council

Nowakowski, J, 1991. Trethellan Farm, Newquay: the excavation of a lowland Bronze Age settlement and Iron Age cemetery, *Cornish Archaeology* **30**, 5-242

Ottway, P, 1992. *Archaeology in British towns: from the Emperor Claudius to the Black Death*, London: Routledge,

Preston-Jones, A, and Rose, P, 1986. Medieval Cornwall, *Cornish Archaeology* **25**, 135-85

Ratcliffe, J, 1997. *Fal Estuary Historic Audit*, Truro: Cornwall Archaeological Unit

Rippon, S, 2008. Coastal Trade in Roman Britain: the Investigation of Crandon Bridge, Somerset, a Romano-British Transshipment Port beside the Severn Estuary, *Britannia* **XXXIX**, 85-144

Rippon, S, and Croft, B, eds, 2008. Post-Conquest Medieval, in Webster, ed, 2008, 195-212

Thorpe, C, 2007. *The Earthwork at Restormel Farm, Lostwithiel, Cornwall. Archaeological Site and Finds Evaluation*, Truro: Cornwall County Council

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework Resource Assessment and Research Agenda*, Taunton: Somerset County Council

Wessex Archaeology, 2008. *Lellizzick, near Padstow, Cornwall. Archaeological Evaluation and Assessment of Results*, Salisbury: Wessex Archaeology

Winterbottom, M, ed, 2007. *William of Malmesbury: Gesta Pontificum Anglorum, The History of the English Bishops: Volume I: Text and Translation* (Oxford Medieval Texts), Oxford: Oxford University Press

WEBSITES

http://en.wikipedia.org/wiki/Devonport,_Devon (Wikipedia – Devonport)

http://www.historic-cornwall.org.uk/csus/towns/newquay/csus_newquay_report.pdf (Newquay CSUS report)

1.2.9 Broad Character: Recreation

1.2.9.1 Character Type: Recreation

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

Recreation refers here to areas whose dominant character arises from activities whose primary purpose relates to leisure, pleasure, or inspiration. This broad definition includes areas devoted to a considerable diversity of coastal and marine specific tourist and leisure activities whose commercial income forms a very important sector of the coastal economy, although it also includes areas dominated by less directly commercial

aspects, such as those frequented by wildlife watchers, and areas given over to extensive public art installations.

Tourism is an important source of income and employment for the South West region with many long established seaside resorts. The defining attributes of this Character Type are late 19th, 20th and early 21st century tourism and recreation features. These are mainly golf courses, coastal chalet/caravan parks and theme parks. Smaller areas of recreational facilities are absorbed into other Types, particularly Settlement.

Recreational activities in the region typically include walking, bird watching, sunbathing, golfing, climbing, and camping. Popular water sport activities involve sea bathing, sailing, surfing, diving, angling, and water and jet-skiing. Visiting coastal heritage sites is also popular with frequently visited sites including Brean Down, Clovelly, Tintagel Castle, Cornwall's industrial heritage at Geevor and Levant, St Michael's Mount, Pendennis and St Mawes Castles, Charlestown, Plymouth Hoe, Kent's Cavern, and the Isle of Portland. Popular natural heritage sites include the Wye Valley, the islands of Steepholm and Lundy, the Isles of Scilly, the rias of South Cornwall and Devon, and the Isle of Purbeck.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Modern tourism has its origins in the Grand Tour of the 17th to 19th centuries, undertaken by young gentry across Europe. The Georgian habit of visiting spa towns was extended to the seaside, popularised by the Prince Regent at the beginning of the 19th century. The South West's tourism industry developed through the 19th century, aided by the introduction of railways. It had a largely seaside bias until the later 20th century when 'quality' tourism encouraged more visitors inland to 'heritage' sites and former industrial landscape.

Fig 37 Windsurfing and kitesurfing at Marazion, Cornwall (Reproduced by kind permission of aroundperranuthnoe.blogspot.co.uk.)

Various resorts have developed in many different ways throughout the region and the South West perhaps holds one of the most diverse ranges of coastal towns in the country. Traditional seaside resorts, with piers, promenades, amusement arcades, fairgrounds, and marine lakes, are mostly confined to the larger towns of the region, whilst many of the smaller towns and villages have retained more of the character of their fishing village origins. The more traditional resorts include Clevedon, Weston-Super-Mare, Minehead, Westward Ho!, Penzance, Torquay, Weymouth, and Bournemouth. Examples of the smaller harbour towns include Watchet, Lynmouth,

Ilfracombe, Clovelly, Bude, Port Isaac, Padstow, St Ives, Mevagissey, Looe, Salcombe, and Lyme Regis. The latter are usually constrained by geography from expanding along the coast and it is the longer beaches that can support the promenades and holiday parks. The distinctive and attractive interplay of land, coast and marine in the environment of Isles of Scilly is responsible for the recent success of tourism, which contributes up to 85% of the islands' GDP (Johns *et al* 2004).

The rise in the popularity of surfing and other watersports has led to the development of resorts catering especially for their needs, mostly for younger tourists. These are often in more remote areas on the Atlantic coast where the best surf beaches are, such as Woolacombe, Polzeath, Watergate Bay, Perranporth, and Sennen Cove, and here a more laid-back culture can often be found. Busier centres such as Newquay rely heavily on large numbers of young clubbers and stag and hen parties, creating an atmosphere sometimes more akin to the Brit-filled resorts of southern Europe than a traditional Cornish harbour town.

In recent years there has been a trend towards moving upmarket and creating specialist niches. Rick Stein has substantially transformed some people's perceptions of Padstow into a smorgasbord of quality eateries. Other renowned chefs have also opened outlets in the region, including Nathan Outlaw's new restaurant at Rock and Jamie Oliver's 'Fifteen' at Watergate Bay. These establishments have raised the upper standards of the region's cuisine and attracted wealthier urban tourists, often on short-break holidays.

The attraction of the coast originally was for swimming and bathing and many resorts boast outdoor swimming facilities. Clevedon and Weston-Super-Mare have marine lakes, where the tide could be trapped and the sea enjoyed throughout the day. Outdoor pools or lidos can be found at Bude, Penzance, and Plymouth, the latter two being particularly fine examples of 1930s Art Deco. Smaller rock-cut pools can be found throughout the region.

The South West has some of the most popular leisure beaches in the country. Tourists were first brought by rail, then, following the surge in personal motoring, by car to the region. North Somerset can boast some of the most popular beaches in the Bristol area, at Clevedon and Weston-Super-Mare, whilst the beaches of Somerset, at Burnham-on-Sea and Minehead attract visitors from further afield. The beaches of North Devon and North Cornwall are particularly spectacular with dramatic cliffs or dunes backing sandy beaches lashed by surf from the Atlantic at places such as Woolacombe, Bude, Newquay, Perranporth and Hayle. West Cornwall has some of the shelliest sand in the country creating white sands and clear blue water at places such as St Ives, Sennen Cove, and Porthcurno whilst the more sheltered south coasts of Cornwall and Devon have a profusion of smaller beaches and coves that can be teeming during the summer months but deserted during the winter. Torbay, the English Riviera, can boast over 20 beaches, whilst Exmouth and Sidmouth are the most popular beaches of East Devon. Dorset can boast a number of picturesque coves such as Lulworth Cove, as well as the more popular Weymouth and Bournemouth with its seven miles of golden sand.

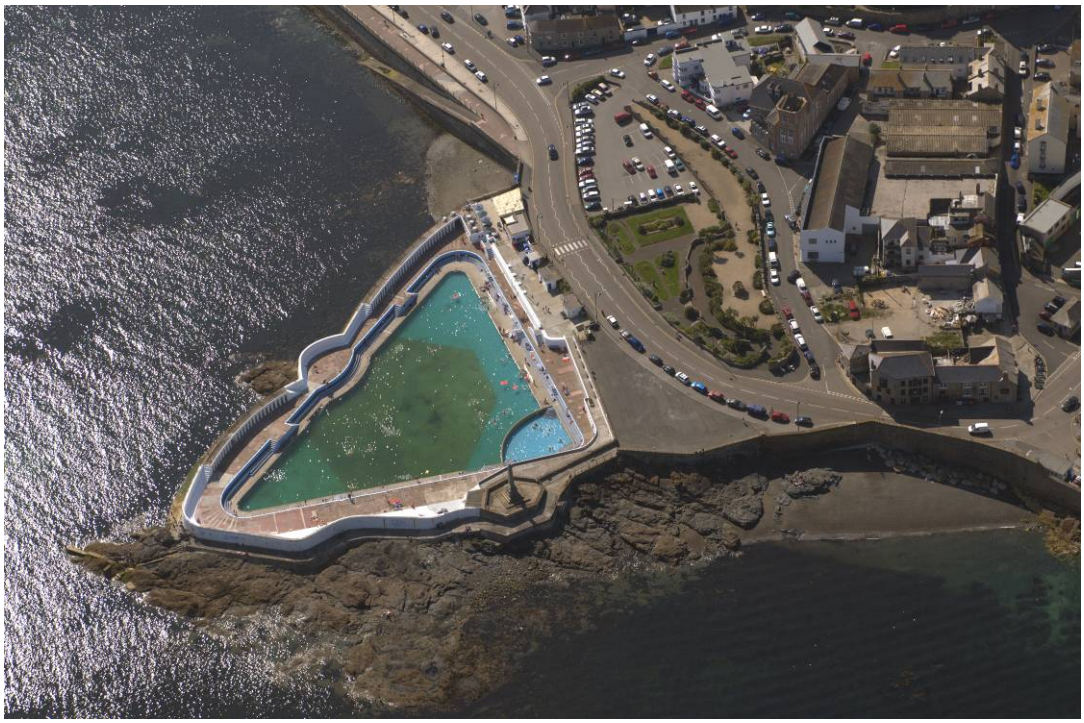

Fig 38 Jubilee Pool, the Art Deco lido at Penzance. (Photograph; Cornwall Council.)

Promenades or esplanades became popular during the Regency period and afforded a means of taking the airs of the seaside with some gentle exercise and the opportunity to meet, and be seen by, one's peers. Promenades were built at Clevedon, Weston-Super-Mare, Burnham-on-Sea, Minehead, and Penzance, with esplanades at Plymouth, Paignton, Sidmouth, and Weymouth, amongst others, the two terms being essentially interchangeable by the later 19th century (the original meaning of esplanade was a level open area outside of a defended structure allowing a clear field of fire against attackers).

Promenades and pleasure piers were built to enable visitors to enjoy the proximity of the sea. Piers were constructed over sometimes long distances so that the sea could be enjoyed even when the tide was out. This was particularly the case in areas with large tidal ranges and gentle offshore topography and in the South West leisure piers are largely confined to the Severn Estuary resorts of Clevedon, Weston-Super-Mare, and Burnham-on-Sea (England's shortest) and to the east of the region's south coast, in Torbay, Weymouth, Swanage, and Bournemouth.

Most piers are of Victorian age and can boast idiosyncratic constructions and pavilions and often intricate iron superstructure. Many have been rebuilt or modified over the years as the result of worm attacks, corrosion, fire, renovation, and the deliberate demolition of sections as an anti-invasion tactic during World Wear Two (WWII).

Self-contained holiday parks were established by Butlins, Pontins, and Warners in the pre- and post-war years. These contained chalets laid out in grids and a range of entertainment facilities including a ballroom that could host dancing and light entertainment, swimming pools, funfairs, bingo, amusement arcades and cinemas. Examples can be found at Burnham-On-Sea, Doniford Bay, Perranporth, Hayle, Exmouth, Poole, and Weymouth (Haven), Minehead (Butlins), Brean (Pontins), Bideford Bay (GB Holidays), Mullion, and Looe (Parkdean).

Many of the larger campsites in the region may offer some of the facilities offered by the holiday camps. These sites are concentrated in the coastal zone, often in flatter areas with long beaches, such as Brean in Somerset. Clusters can be found in North Devon and parts of North Cornwall, elsewhere they may be more infrequent.

Golf has a long history in Scotland but the popularity of the game in England did not really occur until the advent of mass transit in the 19th century. Many of our coastal golf courses date from this period. The Royal North Devon Golf Course claims to be the oldest in England, opened in 1864 (Royal North Devon website), although other golf clubs claim to have an older history (for instance Royal Blackheath – 1745 or older: Royal Blackheath website). Many of the other clubs in the region can claim origins in the 19th century and their courses are historic sites in their own right. Some golf courses in Cornwall also have extensive coastal landscape effects, such as that bordering much of Constantine Bay.

Leisure sailing can be said to have begun with the formation of the Yacht Club, later the Royal Yacht Squadron, in London in 1815. This group came to organise Cowes Week, its annual regatta, and also the first America's Cup, named after the winning vessel of the first round-the-Isle of Wight race in 1851 (Wikipedia). The interest in the sport increased amongst the wealthy as sail declined in commercial and military use towards the end of the 19th century (Evans 2006).

To cope with demand for mooring, victualling, and other services, marinas, either purpose built or through the conversion of older harbour facilities no longer needed with the decline of smaller commercial maritime traffic, were built from the middle of the 20th century. They can be found throughout the region with concentrations in the Fal Estuary, Plymouth Sound, Dartmouth, Torbay, Poole, and Weymouth. Smaller examples of converted former commercial ports can be found at Portishead and Watchet amongst others.

In the 1960s the introduction of the Mirror dinghy, named after the promotion of the craft by the newspaper of that name, made the sport more affordable for the bulk of the population (UCA website). In recent years sea kayaking has enjoyed a boom and inshore waters and estuaries can be busy with a variety of small craft, often throughout the year.

Many kayakers use their craft for angling and this has created another outlet for the leisure angler, in addition to shore and charter boat fishing. Shore fisherman will have their favourite spots, known as 'marks', often on promontories, estuaries, or sandy beaches and the shingle beaches of west Dorset and east Devon are particularly well used for shore fishing (Southwest Sea Fishing website). Angling tourists will often gain local knowledge by repeated visits or through communication with local clubs whilst the more casual tourist will probably fish from a harbour wall. Charter boats take anglers on timetabled or specially ordered trips to local offshore marks, often reefs or wrecks. There are a number of charter boat centres in the region, including Portishead, Watchet, and Minehead in Somerset, Ilfracombe and Clovelly in North Devon, Padstow, Newquay, Penzance, Falmouth, Mevagissey, and Looe in Cornwall, Plymouth, Dartmouth, Brixham, Paignton, and Exmouth in South Devon, and Lyme Regis, Weymouth, and Poole in Dorset (Charterboats UK website). This activity, coupled with the amount of money spent in bait and tackle shops, ensures that leisure fishing forms an important component of local economies. Coupled with bait digging it can also have an impact upon the marine environment.

One of the main attractions of the South West is the profusion of natural habitats suitable for wildlife watching. There are many designated sites and nature reserves around the region's coastline and with the designation of the UK's first Marine Conservation Zone around Lundy Island this has been extended offshore for the first time. The region's estuaries are important sites for wading birds and the Severn Wildlife Trust (now the Wildfowl and Wetlands Trust) opened its first reserve at Slimbridge in 1946 under the guidance of Sir Peter Scott (Wildfowl and Wetlands Trust website). The Isles of Scilly is a popular destination for birding enthusiasts hoping to catch a glimpse of rare species blown off course during the migration seasons of spring and autumn, or for seabirds throughout the year. Boat trips to view marine wildlife can be taken from a variety of the region's ports and resorts.

The South West is an important area for recreational diving with activity concentrated out of the more sheltered south coast ports (Weymouth, Torquay, Plymouth, Falmouth and Penzance) and smaller harbours (Lyme Regis) and the Isles of Scilly, away from the silt rich waters of the Bristol Channel and Severn estuary. On the more exposed north coasts of Devon and Cornwall recreational diving activity is more limited but is well established out of Ilfracombe and Appledore to serve Lundy, and developing on the north coast of Cornwall out of Newquay. The concentration of wreck sites in the south west provides plenty of interest to divers, as do the rocky reefs of Lyme Bay and Kimmeridge and the 'drop-offs' of Eddystone, Wolf Rock, and the Manacles and many of the other rock 'towers' located off the coast of Cornwall. The marine wildlife and underwater visibility of Lundy and the Isles of Scilly is also a great attraction ensuring that both are considered a 'must do' for recreational divers in the UK (Lundy Marine Conservation Zone website). The area surrounding Weymouth is also considered a great place to dive offering a great variety of dives including wrecks, reefs and ledges, and shore dives (British Sub Aqua Club website).

Fig 39 Recreational fishing, Pulpit rock, Portland Bill. (Photograph; Cornwall Council.)

Typical components of this Character Type include walking, bird watching, sunbathing, golfing, climbing, camping, wildfowling, sea bathing, sailing, surfing, diving, leisure fishing, angling, water and jet-skiing.

VALUES AND PERCEPTIONS

Ambivalence is perhaps more pronounced here than in any other Type. Some people have an aversion to the South West's Recreation sites, not just because they are seen as blots on the landscape but also because they are the physical manifestations of the annual invasion of tourists bringing unwanted values, cars and noise to the county, but for many people, recreation sites represent Cornwall's real economy and security for the future. Visitors who have enjoyed glorious summer holidays in the South West develop deep affection for these sites and for the region generally.

The Type normally receives no specific protection, although much falls within designated areas which protect much of the region's coastline for example: World Heritage Sites, Ramsar sites, Special Protection Areas (SPA), Special Areas of Conservation (SAC), National Parks, National Nature Reserves (NNR), Marine Nature Reserves (MNR), Sites of Special Scientific Interest (SSSI), Areas of Natural Beauty

(AONBs), and Heritage Coast. The Isles of Scilly are a Conservation Area, as are a number of coastal resorts and ports. Non-statutory designations include County Wildlife Sites (CWS) and Regionally Important Geological and Geomorphological Sites (RIGS). Coastal heritage sites may be protected as Scheduled Monuments (SM), Listed Buildings (LB), Listed Parks and Gardens and Registered Battlefields. Offshore designations include Protected Wrecks and Marine Conservation Zones (MCZ).

RESEARCH, AMENITY AND EDUCATION

Tourism has had a profound impact on the region's recent economy, infrastructure and social structure. This Character Type is, of course, an amenity for many people; although it also reduces the amenity value of certain stretches of the region's coastline for others.

Further research on this Character Type could focus on understanding the history of tourism at a regional level, understanding its many and varied effects on local and regional historic cultural character to better inform future developments, and developing tools to better enable the prediction of tourism impacts.

Diving clubs that dive on poorly known wrecks could potentially provide local archaeologists and historians with a wealth of new and valuable information on these sites. Collaboration between local divers, archaeologists and historians should be encouraged, providing opportunities to continue developing general public awareness such as the 'adopt a wreck' scheme.

CONDITION AND FORCES FOR CHANGE

The Type is generally active and both the Type and the components within it survive well, although the creation of golf courses and caravan parks can involve a large scale dismantling of existing landscape features and the creation of new ones. Piers and their buildings seem to be highly prone to fire and many have been rebuilt, often on multiple occasions.

Golf courses are still being created and chalet/caravan parks expanded. Theme parks are also still being established. Within the Type, gradual refurbishment and updating threatens some early features, although Golf courses often retain some fragments of field systems or ancient woodlands in their landscaping, although these features are often fragmented.

Constraints on conspicuous development along the South West's coast exert control on the locations and forms of Recreation complexes. Economic and climate changes may lead to increases in British holidaying in the South West; climate change may also affect the coastline that is a key attraction.

RARITY AND VULNERABILITY

This Character Type is common in the South West. Within this Type, refurbishment and updating represent a threat to some early features in the South West region. For example, the creation of golf courses and caravan parks involve dismantling of existing landscape features and the creation of new ones.

PUBLISHED SOURCES

Brodie, A, and Winter, G, 2007. *England's Seaside Resorts*, Swindon: English Heritage

Evans, J, 2006. *The complete sailing handbook*, London: Anness Publishing

Fisher, S, ed, 1997. *Recreation and the Sea*, Exeter: University of Exeter Press

Johns, C, Larn, R, and Tapper, B, 2004. *Rapid Coastal Zone Assessment for the Isles of Scilly, Historic Environment Service*, Truro: Cornwall County Council

Mattingly, J, and Palmer, J, eds, 1991. *From Pilgrimage to Package Tour*, Truro

Rainsley, M, 2008. *South West Sea Kayaking, Isle of Wight to the Severn Estuary*, Caernarfon: Pesda Press

WEBSITES

http://en.wikipedia.org/wiki/Seaside_resort (Wikipedia - seaside resorts)

http://en.wikipedia.org/wiki/Holiday_camp (Wikipedia - holiday camps)

http://www.royalnorthdevongolfclub.co.uk/ (Royal North Devon Golf Club)

http://www.royalblackheath.com/index.lasso?pg=64bdb7d8832fd28b&mp=74906fce20a6b80c (Royal Blackheath Golf Club)

http://en.wikipedia.org/wiki/Royal_Yacht_Squadron (Wikipedia - Royal Yacht Squadron)

http://www.theheritagetrail.co.uk/alpha_lists/pierlist.htm (Heritage Trail - piers)

http://www.bbc.co.uk/insideout/west/series7/birnbeck_pier.shtml (BBC - Birnbeck Pier)

http://www.bbc.co.uk/news/uk-11603001 (BBC News - Weston-Super-Mare's Grand Pier)

http://www.southwestseafishing.co.uk/ (Southwest Sea Fishing)

http://www.charterboats-uk.co.uk/england/southwest/ (Charterboats UK)

http://www.wwt.org.uk/visit-us/slimbridge (Slimbridge)

http://www.ucreative.ac.uk/index.cfm?articleid=11891 (University of the Creative Arts – Mirror dinghy)

http://services.parliament.uk/bills/2009-10/secondhomeownershipregulation.html (Parliament - Second Home Ownership (Regulation) Bill 2009-10)

http://www.bbc.co.uk/news/uk-11603001 (BBC News - Weston-Super-Mare's Grand Pier)

http://www.bsac.com/divelocations.asp?section=1251 (British Sub-Aqua Club)

http://www.lundymcz.org.uk/explore/diving (Lundy Marine Conservation Zone)

1.2.10 Broad Character: Cultural Topography

1.2.10.1 Character Type: Palaeolandscape Component

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

There is evidence for human activity across Britain and mainland Europe for the last 700,000 years. For all parts of the Pleistocene period there is a potential for archaeological material deposited in sediments on the continental shelf. Throughout the Quaternary period sea levels have risen and fallen in conjunction with glacial retreat and advance. This will have ranged from the 130m-140m bathymetric contour which marks the level of mean sea level during the last glacial maximum, the Devensian, 21ka [ka = thousand years ago] to 18ka (Hosfield *et al* 2008, 24) to levels higher than today. Throughout this period the South West will have remained relatively isolated from continental Europe to the south, either by sea or by an English Channel river system (Hosfield *et al* 2008, 24-5).

Within the Severn Estuary a sequence of Holocene sedimentary deposits has been identified known as the Wentlooge Formation, with subdivision into Lower, Middle, and Upper. The Lower Wentlooge deposits comprise thick silts with either very thin or no peats and date to the Mesolithic to Neolithic periods. The Middle Wentlooge deposits are predominately thick peats with intercalated silts dating to the Bronze and Iron Ages. The Upper Wentlooge deposits are thick silts with no peat and date to the Roman period. There are large exposures of this material in the intertidal zone due to coastal erosion.

Above the Upper Wentlooge Formation is the Rumney Formation comprising Upper and Lower subdivisions. The Awre and Northwick Formations are later, immediately below the extant saltmarsh dating to the 19th and 20th centuries. The Wentlooge deposits are patchy in their distribution and truncation has occurred in the Upper Formation where reclamation of land and construction of flood defences has occurred.

Peat growth within the Somerset Levels has preserved many organic remains of both human and natural origin. Remains range from large oaks which can be used to aid dendrochronology to microscopic floral and faunal remains. Evidence of animal activity that has shaped the development of the Levels can be seen in beaver-gnawed wood recovered from various sites throughout the area (Brunning 1993, 55-6). Coastal sequences of peats have been exposed in Cornwall at St Ives, Marazion Marsh, Chyandour, Praa Sands, Porthleven, Church Cove (Gunwalloe) and Porthallow, and Pendower (Roseland) (Straker 2011).

Submerged forests, consisting of the remains of sometimes large trees and roots, can be found around the coast of the region with notable examples to be found at Stolford, Minehead, Porlock, Westward Ho!, Mount's Bay, Praa Sands, and Maenporth. Others are buried beneath thick estuarine deposits and were discovered during operations to recover alluvial tin, mostly during the 19th century.

Elsewhere, palaeolandscapes have been less well-preserved due in the main to a more dynamic coastal regime. Exceptions can be found in the intertidal peats of North Devon, the Isles of Scilly, and Cornwall, and the ria valley sediments of the latter.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The principal driving force of landscape change throughout the Quaternary Period has been the sea level fluctuations associated with glacial and interglacial periods and the effect this has had on the available landmass and on river drainage systems. Deposits containing archaeological or palaeoenvironmental remains include river terrace gravels, periglacial head deposits, estuarine muds and clays, and organic peats.

The palaeogeography of the region has been heavily influenced by changes in sea level with, for instance, vast swathes of land that were available to early post-glacial Upper Palaeolithic and Mesolithic settlers now being underwater, including most of the coastline then available for their exploitation. Mean Sea Level has risen 130m-140m since the Last Glacial Maximum around 18ka BP, with 30m-40m of that occurring during the post-glacial period. This rise was more rapid in the early post-glacial and much of the shape of the present coastline was broadly reached by 7000-6000 BP, a time when mean sea level was 4m-6m lower than it is today (Hosfield *et al* 2008, 27). However, some areas such as the Somerset Levels, lying behind coastal sand dunes, and the banks of the Severn Estuary, subject to marine regressions during the Bronze and Iron Ages and drainage and reclamation schemes from the Roman period onwards, have a much more dynamic recent maritime history (Bell and Walker 1992, 126-9).

The Severn Estuary has a sedimentary sequence spanning both banks that records a series of Holocene marine transgressions and regressions. The early Holocene is represented by a thick deposit of clay known as the Wentlooge Formation that contains a record of sea level changes in the form of intercalated peats and also footprints of Mesolithic people and fauna in the clays themselves (Bell and Walker 1992, 128-9). The deposit is up to 15m thick (Barnes 1993, 7). The peats and forest beds are widespread throughout the study area, many of them visible at low tide.

Many of these organic deposits preserve a wide range of biological remains including wood, pollen, plant macrofossils, insects, diatoms, and foraminifera. Pollen sequences dating to the Mesolithic Period (10ka-6ka BP) are particularly well represented in the South West with examples in the Severn Estuary (Oldbury, South Gloucestershire and Gravel Banks, Bristol), the Somerset Levels, the Gordano Valley, Bridgewater Bay (Burnham-on-Sea and Stolford), Minehead, Porlock Bay, Westward Ho!, Trewornan and

Marazion Marsh in Cornwall, and several intertidal sites on the Isles of Scilly (Hosfield *et al* 2008, 40-1).

The intertidal area at Westward Ho! contains extensive Mesolithic forest and peat beds, part of which overlay a midden containing flints, bone, shell, and plant macrofossils. The midden has been dated to the sixth millennium BC and is important as the only known wetland occupation site of this period in the South West. Recent studies suggest that the midden has now eroded away but there is a potential for similar features within the organic deposits at this location. These deposits have been subjected to detailed studies in recent years and analyses have been carried out of plant macrofossils, pollen, insects, molluscs, animal bones, and diatoms as well a palaeomagnetic dating of silts. The studies have revealed a freshwater habitat of fen woodland with fauna present including aurochs, wild pigs, and red and roe deer (Hosfield *et al* 2008, 41-2).

The evidence from further up the Bristol Channel is for more marine-influenced environments during the Mesolithic. At Porlock Bay up to 10m of intercalated silts, sands, and peats dating from *c*6700 cal BC reveal saltmarsh and lagoon environments alternating with episodes of wet woodland growth during times of marine regression. The presence of a shingle barrier has influenced these changes and this has been demonstrated recently when the barrier was breached in 1996 allowing large-scale erosion of the area behind it which has revealed palaeochannels and old land surfaces (Hosfield *et al* 2008, 42).

At Minehead a detailed palaeoecological survey has been facilitated by sea defence work. Studies of insects, pollen, plant macrofossils, foraminifera, and diatoms from peats and clays have revealed a saltmarsh environment grading to an alder carr woodland as the ground rose. The deposits range from *c*5670-4360 cal BC. The peat beds visible in the foreshore at Burnham-on-Sea and Stolford in Bridgewater Bay are younger, between 5000-4000 cal BC (Hosfield *et al* 2008, 42-3). Submerged forests are found at Porlock and Stolford, the former probably dating to 8ka to 5ka BP, whilst the latter has been dated to around 5000 BC (Hosfield *et al* 2008, 52-3). The coastline around Porlock contains artefacts of Late Mesolithic date, from the shingle ridge and from the cliffs to the east. The submerged forests at Minehead and Porlock Weir have also produced Mesolithic flints.

The Somerset Levels are situated between the limestone hills of the Mendips to the north and the Poldens to the south in a broad valley or former inlet which contains up to 30m of sediments and drains the Rivers Parrett, Brue, Axe, and Huntspill. These sediments include large deposits of peat, the earliest of which from Highbridge has been dated to *c7*900-7000 cal BC. These were up to 20m below OD. The peats of the Levels have been intensively studied and reveal a wet woodland, predominately alder carr, as well as open water and swamp habitats. This period was ended by a major marine inundation in the late 6th to early 5th millennium cal BC represented by the Lower Wentlooge formation of clay which has derived from extensive saltmarsh development extending inland as far as Glastonbury and the foot of the Mendips. A marine regression is then signified around 4600-4200 cal BC by the renewed formation of peat (Hosfield *et al* 2008, 43-4).

The situation further up the Severn Estuary is rather different with few Early Mesolithic artefacts recorded but a much richer record for the later Mesolithic, most of these from the Cotswolds. A Mesolithic land surface has been recorded at Oldbury, sealed by a peat deposit. The land surface contains lithic artefacts and also charcoal, indicating the impact of people upon the coastal woodland. Further unstratified assemblages have been recovered just upriver at Hills Flats (Hosfield *et al* 2008, 56-7).

Intertidal peats on the Isles of Scilly have been radiocarbon-dated to the late Mesolithic and early Neolithic and suggest mixed deciduous woodland was present at this time (Ratcliffe and Straker 1996). The Lyonesse Project, funded by English Heritage, has recently completed a reappraisal of the history of marine transgression in the islands following the discovery of a submerged forest off St Mary's in 2005. Twenty-nine peat

and sediment sequences were analysed and 78 further radiocarbon dates obtained. This work provides a finer-grained understanding of the changes in sea-level in the archipelago with significant changes in transgression in the early Mesolithic, Neolithic and Early Bronze Age periods; particularly interesting is a charcoal peak in the vegetation record during the Late Mesolithic which could indicate deliberate wood (Charman *et al forthcoming*).

Two sites on the Cornish mainland have produced Mesolithic dates: Marazion Marsh was found to contain organic sediments lying on bedrock that had overlying intercalated bands of sand and organic deposits which were interpreted as representing coastal barrier dynamics and sea level change; Trewornan on the Camel Estuary had organic sediments lying on a buried soil representing reed swamp followed by an alder carr that was then buried by marine sands (Hosfield *et al* 2008, 41).

Whilst the results and rates of changes in sea-level are difficult to apply across the entire South West (due to differences in slope, exposure to tide and swell, and sediment inputs and barriers) it can be understood in general terms: The sea level rise in the early Holocene has been estimated at 1cm per annum which slowed after 7ka-6.5ka BP. The rate of coastal change has been complicated by regional factors such as isostatic subsidence and local such as dune and spit formations (Hosfield *et al* 2008, 40-1). During the Neolithic sea level continued to rise and by the Middle Bronze Age was around 1m-2m below current levels. This rise in sea level had an effect on river valleys since their gradients were reduced and this led to the evolution of more meandering forms. The presence of established woodland and less flooding episodes led to fewer channel migrations and sedimentation than seen from the Later Bronze Age onwards. This change in behaviour is seen as a result of more human interference in the landscape in the form of clearances (Wilkinson and Straker 2008, 63-4).

Elm declines are recorded in many pollen diagrams from the South West around 3700 BC, including from the Somerset Levels (3640-3370 cal BC (SRR-882) but from above the Sweet Track which is dated by dendrochronology to 3807/6 BC and 3660-3370 cal BC (SRR-542) at Abbots Way) and at Avonmouth (soon after 3640-3360 cal BC (NZA-12530)). In some cases the elm decline is followed by an expansion of grass and cereal pollen but woodland regeneration occurred after *c*2900-2800 BC. Further woodland clearance is recorded after 1700 BC (Wilkinson and Straker 2008, 71).

Evidence of Middle Bronze Age occupation in the Somerset Levels is largely limited to finds of pottery and flint from some of the sand 'islands' found on the northern edge of the Polden Hills (Fitzpatrick (ed) 2008, 117). Environmental evidence from the Brue valley indicates the dominance of raised bog vegetation whilst from Sedgemoor the indicators are that more diverse habitats, such as fen woodland, reedbeds, and areas of open water, were available. Trackways through the Levels continued to be constructed; 19 groups of trackways belonging to the Bronze Age have been identified in Somerset, some several kilometres long running from the Polden ridge to the former islands of Meare, Westhay, and Burtle (Fitzpatrick (ed) 2008, 120-1).

From the Late Bronze Age onwards more localised changes in coastline become apparent such as the flooding of the Somerset Levels in the first millennium BC as the result of sea level change. Flooding events are also blamed on increased runoff in river catchments caused by tree clearances (Straker *et al* 2008a, 105). An intertidal peat deposit of Late Bronze Age date at Thurlestone Rock, South Devon indicates open grazed pasture close to the wet fen represented by the peat and also suggest rapid local coastal change. A long sequence in a peat deposit at Salcombe spans the Middle Bronze Age to Roman period and shows a mire vegetation of alder carr succeeded by more open conditions and finally drying out (Straker *et al* 2008a, 111).

The palaeoenvironmental evidence from the Somerset Levels points towards wetter conditions and further sea level rise in the first millennium BC leading to the flooding of raised bogs and fen woodland at Meare Heath, Sharpham Manor, and Glastonbury Lake Village. Studies of stratigraphy, pollen, and diatoms have led to the conclusion that the

latter was located within reach of tidal channels opened up by marine ingressions and was in essence a coastal port. Peat deposits in Poole Harbour show evidence for a marine incursion in the Middle to Late Iron Age (Straker *et al* 2008a, 106-9).

A focus for later prehistoric settlement in the Avon Levels appears to have been at Hallen where saltmarsh was succeeded by pasture in the Middle to Late Iron Age, probably supporting seasonal grazing in a stable and relatively dry environment, either the result of drainage or a lower water table. A subsequent marine ingression, probably of post-Roman date, deposited alluvium up to 1m thick over the area, although not before a humic soil associated with the abandonment of the settlement and containing evidence of tree growth had formed (Barnes 1993; Straker *et al* 2008a, 109-10).

Further upstream the Severn Valley appears to have been occupied by a long-lived alder floodplain woodland environment throughout the Iron Age represented by a peat deposit 4.5m thick at Longney. This is in contrast to the intercalated peats and silts over much of the Severn Levels (Straker *et al* 2008a, 110).

On the Somerset Levels peat was still being formed during the Roman period but later peat cutting has removed much of this resource. Analysis of surviving material shows that raised bog conditions pertained at many locations inland whilst closer to the present coastline saltmarsh prevailed. Early Roman salt production took place on saltmarsh at Puxton Dolemoor on the North Somerset Levels whilst peat was used to fuel saltmaking at East Huntspill to the south. Saltmarsh was established in the Axe valley on top of prehistoric peat deposits (Straker *et al* 2008b).

Land reclamation transformed parts of the Somerset and Severn Levels during the Roman period with many hectares of saltmarsh turned into pasture. There is evidence that large areas of this land were reclaimed by saltmarsh during the early medieval period following a substantial marine transgression, which only the North Somerset Levels escaped (Rippon 1993, 31). The thick accumulation of sediments in the Avon Levels has ensured that the archaeology of the area is little known and is difficult to assess (Barnes 1993, 27). Subsequently, large scale reclamation of vast swathes of the

Levels was undertaken during the 11th to 13th centuries, the evidence for which is largely documentary.

Palaeoenvironmental evidence for the early medieval period is almost completely lacking from the region. Buried soils beneath blown sands have been identified at a couple of sites in South Devon and these contained evidenced of farming practices (Straker 2008a, 165-6). In Bridgwater Bay a number of radiocarbon and dendrochronological dates from the 9th and 10th centuries through to the early post-medieval period were obtained from fish traps (Straker 2008b, 187).

During the medieval period softer parts of the coastline are likely to have been eroded away from the shores of the Severn, perhaps in the order of several hundred metres. Erosion of the bank of the Severn at Hills Flats may have claimed a Romano-British settlement, as shown by the substantial amount of occupation debris of this period scattered along the intertidal zone to the north-east of the mouth of Hill Pill (Allen and Fulford 1993, 39-40). At the same time inland sand dune migration further down the coast claimed more land by the sea (Straker 2008b, 193).

Demonstrating that marine incursions can be catastrophic events, reports of a massive flooding event in the Bristol Channel in January 1607 include reference to the breaking of the sea bank at Burnham in which some 30 villages were inundated, with people and livestock swept away and drowned. The accounts state that 28 people were drowned at Huntspill and 26 at Brean, with a death toll that was similar in many other villages. In Barnstaple the wave burst open doors that were locked and bolted and knocked down walls and houses. Analysis of historical documents has suggested that flooding may have been caused by a tsunami (Bryant and Haslett 2002), but no sediments associated with the event have been identified (Straker 2008c, 209).

Over time river channels through the region have migrated, eroding new paths through the underlying deposits. The intertidal course of the River Parrett has changed gradually since 1832, as shown by historical mapping, with more rapid changes occurring in the last 20 years causing problems for pilotage within the Bridgewater Harbour Area (McDonnell 1993, 43). The erosion of deposits by moving channels will have diminished the potential for palaeoenvironmental material in the areas where this has occurred. At the same time a channel cutting a new course through such deposits will make new profiles available to study (McDonnell 1993, 45).

VALUES AND PERCEPTIONS

The archaeological community has only slowly built on the recognition that maritime archaeology is not only concerned with shipwrecks but also submerged former terrestrial landscapes and more recently, the character of all human activity and its effects on the marine environment. The archaeological potential that exists on the continental shelves has become more recognised in the UK in recent years, especially from projects paid for through the Aggregates Levy Sustainability Fund (ALSF) (see ALSF web page), due to the recent expansion of aggregate dredging onto the shelf. Academic and cultural resource management perspectives consider it important to locate and research this archaeological resource. However, for the wider community, the existence and archaeological potential of these submerged landscapes is still poorly known for this region as compared to others where high profile media features, as on 'Doggerland' in the North Sea, has raised public awareness.

The submerged forests of Bridgwater Bay and of Devon and Cornwall have largely been known and reported on since the 16th century (eg Boase 1822; Carne 1846). Many appear on Ordnance Survey maps and although sometimes rarely observed are well known from this source. Others were discovered during alluvial tin workings in the ria valleys of Cornwall (e.g. Colenso 1829). The large remains of long-dead trees excite local interest on the rare occasions that they are exposed (French 1999).

RESEARCH, AMENITY AND EDUCATION

A number of areas in the South West have particular archaeological potential. Generally banks that have pre-Holocene cores or are not modern marine sand bedforms could have once formed headlands, promontories, or islands. Closely spaced banks would have narrow channels between, places that would have provided both shelter and good fishing. Depending upon the precise gradients and topography, low ground adjacent to higher ground is likely to be archaeologically productive. Areas of particular potential include those favourable for occurrence and preservation of submerged prehistoric sites. Principally these include:

- Fossil estuaries, river valleys, and palaeochannels.
- The flanks of submerged banks and ridges proven to have peat layers, or which are likely to have peat layers.
- The Levels with peat, wetland, or saltmarsh deposits, and intercalated marine clays marking transgressions.
- Wetlands, estuaries, nearshore creeks, intertidal mudflats, peat deposits, marine and alluvial clays.
- Low gradient beaches with constructive onshore wave action.
- 'Fossil' archipelago topographies where sites were sheltered by low-lying islands as the sea level rose.
- Deposits of sediments formed within, or washed into rocky gullies and depressions.
- Cliff coasts of periglacial head deposits that may contain artefacts which are eroded onto the shore (the rocky Devon and west Somerset coasts present such potential).

- Caves and rock shelters in re-entrant bays, fossil erosional shorelines, submerged rocky shores protected by other islands (Flemming 2004, 15).

CONDITION AND FORCES FOR CHANGE

Peat extraction throughout the twentieth century on the Somerset Levels has removed large amounts of palaeolandscape containing palaeoenvironmental and archaeological information. In turn this has created a more recent archaeological landscape of peatworkings and associated infrastructure. Recent plans to reflood parts of the Somerset Levels have raised concern about the loss of this industrial heritage, potential damage tithe archaeological resource by increased root activity from wetland flora, and damage tithe peats and clays by excavation of material to create bunds (Cox and Rackham 1993, 57-8).

Development pressures in the form of industrial and urban development, particularly on the Avon Levels, have removed or disturbed large areas of palaeolandscape and the later landscape components that sat on them (Rippon 1996, 2). The proposed Atlantic Array offshore windfarm has recently been dropped by the developer. Proposed tidal barrage schemes for the Severn Estuary were abandoned as unviable in 2010.

The Severn Estuary and Bristol Channel is a dynamic environment and changes in channel courses and the accretion and erosion of sediments can be expected to continue to change, often in unpredictable ways. Studies conducted in Bridgewater Bay have demonstrated the dynamic nature of the mouth of the River Parrett over time derived from an historical dataset. In recent years the mouth of the Parrett has drifted towards Burnham-on-Sea whilst the outer estuary and tidal delta has swung to the west towards Hinkley Point (Environment Agency 2009).

Trawling and beam trawling in particular are known elsewhere to have impacted on buried palaeolandscapes or artefacts revealed on the sea-bed but evidence for such effects in this region is currently lacking.

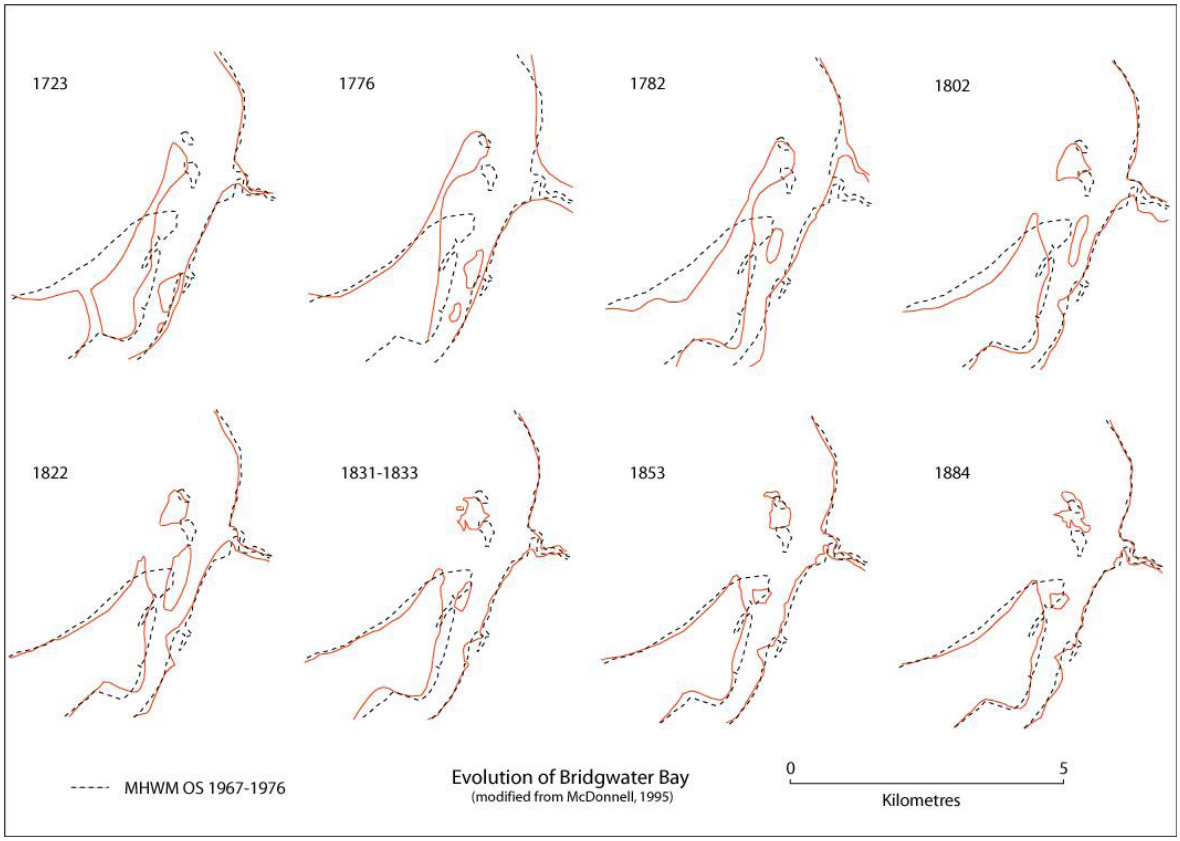

Fig 39 Historical movement of the mouth of the River Parrett from 1723-1884 (Environment Agency 2009)

RARITY AND VULNERABILITY

The recovery of Palaeolithic artefacts is often associated with the gravel extraction industry and indeed some of the finds from the study area, such as those at Barnwood, are from gravel pits. However, this industry has a relatively low profile in the South West and this may explain the low density of finds from this period in the region compared with, for instance, South East England (Hosfield *et a*l 2008, 39).

Natural erosion seems to be the biggest threat, but with increased likelihood of off-shore aggregate extraction, oil and gas drilling, and the construction of offshore windfarms, there is a growing need for further research into palaeolandscapes (Petts and Gerard 2006, 203).

PUBLISHED SOURCES

Allen, J R L and Fulford, M G, 1993. A Late Flandrian tidal palaeochannel at Hills Flats on the Avon-Gloucestershire border in Bell (ed)

Allen, J, 2001. Sea level, salt marsh, and fen: Shaping the Severn Estuary Levels in the Later Quaternary (Ipswichian-Holocene) in *Estuarine Archaeology: the Severn and Beyond. Archaeology in the Severn Estuary* **11**, 13-34

Barnes, I, 1993. Second Severn Crossing: English Approaches, an interim statement on the 1992/93 fieldwork in Bell (ed)

Bell, M, ed, 1993. *Archaeology in the Severn Estuary 1993*, Annual Report of the Severn Estuary Levels Research Committee, Exeter

Bell, M, and Walker, M J C, 1992, *Late Quaternary Environmental Change, Physical and Human Perspectives*, Harlow: Longman Scientific and Technical

Boase, H S, 1822. Observations on the Submersion of part of the Mount's Bay; and on the Inundations of marine sand on the north coast of Cornwall, *Trans Roy Geol Soc Cornwall* **2**, 129-144

Brunning, R, 1993. Fieldwork in the Somerset Levels and Moors in Bell (ed)

Bryant, E A and Haslett, S K, 2002. Was the AD 1607 coastal flooding event in the Severn Estuary and Bristol Channel (UK) due to a tsunami?, *Archaeology in the Severn Estuary* **13**, 163-7.

Carne, J, 1846. Notice on the remains of submarine forest in the northeastern part of Mount's Bay, *Trans Roy Geol Soc. Cornwall* **6,** 230

Charman, D, Johns, C, Camidge, K, Marshall, P, Mills, S, Mulville, J, and Roberts, H M, forthcoming. *The Lyonesse Project: a study of the evolution of the coastal and marine environment of the Isles of Scilly*, Truro: Cornwall Council and English Heritage

Cox, M and Rackham, J, 1993. 'Survey of a derelict industrial landscape at Shapwick Heath, Somerset' in Bell (ed)

Colenso, J W, 1829. A description of the Happy Union Tin Streamwork, at Pentuan. *Trans. Roy. Geol. Soc. Cornwall* **13**, 313-8

Environment Agency, 2009. Preferred Parrett Estuary Flood Risk Management Strategy Report Appendix E: geomorphology, Environment Agency SW Region

Fitzpatrick, A (ed), 2008. Later Bronze Age and Iron Age in Webster, ed, 2008, 117-44

Flemming, N C, 2004. 'The prehistory of the North Sea floor in the context of Continental Shelf archaeology from the Mediterranean to Nova Zemlya' in NC Flemming (ed), Submarine prehistoric archaeology of the North Sea: Research priorities and collaboration with industry, *CBA Research Report* **141**, English Heritage/Council for British Archaeology

French, C N, 1999. 'The submerged forest palaeosols of Cornwall', Geoscience in south-west England **9**, 365-369

Hosfield, R, Straker, V and Gardiner, P, 2008. Palaeolithic and Mesolithic, in Webster, ed, 2008, 23-62

McDonnell, R, 1993. 'Preliminary archaeological assessment in Bridgewater Bay: Gore Sand and Stert Flats' in Bell (ed)

Mackie, A S Y, James, J W C, Rees, E I S, Darbyshire, T, Philpott, S L, Mortimer, K, Jenkins, G O, and Morando, A, 2006. *The Outer Bristol Channel Marine Habitat Study: Summary Document, Amgueddfa Cymru*, National Museum Wales, Cardiff

Mullin, D, Brunning, R, and Chadwick, A, 2009. *Severn Estuary Rapid Coastal Zone Assessment Survey, Phase 1 Report*, English Heritage

Pollard, J and Healy, F, eds, 2008. Neolithic and Early Bronze Age in Webster, ed, 2008, 75-102

Rippon, S, 1993. The Severn Wetlands during the historic period in M, Bell, ed

Rippon, S, 1996. Gwent Levels: evolution of a wetland landscape, *CBA Research Report* **105**

Rippon, S, 2000. Romano-British exploitation of coastal wetlands: North Somerset Levels, *Britannia* **31**, 69-200

Straker, V, 2008a. Early Medieval environmental background in Webster, ed, 2008, 163-8

Straker, V, 2008b. Post-Conquest Medieval environmental background in Webster, ed, 2008, 189-94

Straker, V, 2008c. Post-Medieval to Modern environmental background in Webster, ed, 2008, 209-12

Straker, V, 2011. Appendix 1: Palaeoenvironmental studies in west Cornwall in P Dudley *et al*, *Goon, hal, cliff and croft: the archaeology and landscape history of west Cornwall's rough ground*, Truro: Cornwall Council

Straker, V, Brown, A, Fyfe, R, Jones, J, and Wilkinson, K, 2008a. Later Bronze Age and Iron Age environmental background Webster, ed, 2008, 103-16

Straker, V, Brown, A, Fyfe, R, and Jones, J, 2008b. Romano-British environmental background in Webster, ed, 2008, 145-50

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council

Wilkinson, K, and Straker, V, 2008. Neolithic and Early Bronze Age environmental background in Webster, ed, 2008, 63-74

WEBSITES

http://archaeologydataservice.ac.uk/archives/view/alsf/search_maritime.cfm (Aggregates Levy Sustainability Fund)

http://www.cornwall.gov.uk/default.aspx?page=20033 (Cornwall Council Historic Environment Projects, Lyonesse Project news page)

http://www1.somerset.gov.uk/archives/ASH/index.htm (Somerset County Council - Aspects of Somerset History)

1.2.10.2 Character Type: Cultural Topography (Landward)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type refers to those aspects of cultural topography whose physical expressions occur predominantly to landward of Mean High Water and which possess various aspects of maritime cultural character, and includes cliff, dunes, lakes, ponds, reservoirs, watercourses, wetland and lagoons.

Much of the South West coastline is fringed by sea cliffs, of varying geology and form. In many places these extend into the sea as subtidal rocky reefs. Weathering has produced a multitude of forms that include caves, arches, and stacks and cliffs as a whole form distinctive and characteristic shapes that are often named and serve as familiar coastal landmarks, also serving as guides to their position for local sea users.

Low-lying areas between cliffs on windward shores are likely to support dune systems consisting of ridges and intervening slacks of windblown sand, which may or may not be stabilised by vegetation cover. Dune systems may have a long history often characterised by episodic instances of sand inundation followed by long intervening periods of stabilisation. They may protect low-lying areas to landward from tidal inundation and here freshwater or brackish bodies of water may collect.

Lakes and ponds are inland bodies of semi-natural origins: although many may have formed as a response to glacial meltwater probably all wholly will have been defined artificially to some extent. Reservoirs are artificial bodies of water, the majority constructed to hold water destined for human consumption, some as sources of hydroelectricity. Many now host a variety of watersports. Watercourses may take the form of natural channels such as streams or rivers or artificial in the form of drains and aqueducts. Their historical importance derives from their function as both barriers and routeways, giving rise to their use as territorial boundaries, a role that continues today as county and parish boundaries. Lagoons are areas of open water totally or partially separated from the sea by a dune system, barrier beach, or reef.

Wetlands indicate areas either permanently or intermittently saturated with predominately freshwater and may take the form of fens, marshes, or peat bogs. These areas have often been marginal to people's everyday experience in the past and thus unfamiliar to many, leading to an investment of ritual significance reflected by, for instance, the deposition of hoards and in general the shunning of such areas by the majority of the population. Many wetland areas are now nature reserves. Wetlands have been, and continue to be, an important spiritual and economic resource for humans. They are ecologically rich and biodiverse when in their unmodified state and when they are drained they provide fertile, if heavy, soils for farming (Rippon 1996, 1).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

The geology of the South West coastline is varied, ranging from mudstones, limestones, and sandstones on the English side of the Severn Estuary, through the sandstones of Exmoor, the slates and shillet of North and South Devon and Cornwall, the granite of Penwith and Isles of Scilly, the metamorphosed serpentine of the Lizard, the schists of Start Point, the sandstones of East Devon, the chalk of the 'Jurassic Coast', and the limestones and mudstones of Dorset. These, in conjunction with the prevailing tides and winds, give rise to a variety of cliff forms from the high steep cliffs of North Devon and North Cornwall, the rounded granite cliffs of the far west, to the gentler cliffs of the south coast. Similar geology can be moulded into very different landforms as the contrast between the cliffs of North Cornwall at, for instance, Watergate Bay, and South Cornwall at Whitsand Bay, both formed of the same mudstones, siltstones, and sandstones, amply demonstrates. The former are high sheer cliffs whilst the latter form a low cliff rising more gradually to landward, both to a similar height of 80-100m.

Fig 40 St Piran's Church, Cornwall in the early 20th century. (Photograph; Royal Cornwall Museum.)

The sections exposed in cliffs form valuable windows into the geological processes that formed them, from the extreme folding seen at, for instance, Hemmick on the Roseland peninsula in Cornwall, to the fossil bearing chalks of the Jurassic Coast of Dorset. These exposures have played a role in the historical development of geology and palaeontology and this forms part of the designation of the Jurassic Coast as a World Heritage Site.

Clifftops have played an important role as vantage and defensive points throughout history, from the cliff castles of the Iron Age, through Roman signal stations, through the Huers' huts where Cornish fishermen kept a lookout for the schools of pilchards, and Napoleonic, Palmerstonian, e.g. Tregantle Fort, and 20th century military defences.

Exposures of rocks in cliff faces can make prospection for stone or aggregates much simpler than inland and cliffs can exhibit many remains of quarrying. Few still operate and those that do are generally large-scale operations such as at Newlyn and Dean Quarry at Porthoustock, Cornwall (road aggregate), and at the Isle of Portland, where limestone is still extracted for building stone and deeper deposits of chert, made accessible by modern machinery, are quarried for aggregate (Visit Weymouth website). Older quarrying was often on a smaller, though not inconsiderable, scale. The cliffs around Tintagel bear witness to the largely 19th century quarrying of slates for roofing, with large square-cut indentations visible in the cliff edges.

Dunes often form along coastlines lacking cliffs and form a quite different barrier to the sea. They can be highly mobile on short timescales and large inundations may occur as a result of a single storm given the conjunction of the right conditions. It has been recorded that depths of 2-3m of sand have covered agricultural land in a single event in recent times at Gwithian on the north Cornwall coast (Nowakowski *et al* 2007, 58). The rapidity of the inundation and the alkaline nature of the sand itself have led to the exceptional preservation of human remains at coastal locations, predominately on the North Cornish coast, which can boast the most extensive examples of Iron Age and Roman cemeteries in the region (Whimster 1981). Buildings too have been preserved including iconic structures such as the early medieval oratory associated with St Piran at Perran Sands and the later medieval church to which the parishioners retreated

before this too succumbed to inundation by the sands in the early 19th century (Cole 2005).

The region has a large area of former coastal inundations and later wetland in the Somerset, Avon, and Severn Levels much of this has been reclaimed and enclosed in the present landscape, but there is evidence for early settlements, trackways and ritual activity. There are still large areas of wetland remaining and these can be important archaeological resources and wildlife habitats. The Severn Wildlife Trust (now the Wildfowl and Wetlands Trust) opened its first reserve at Slimbridge in 1946 under the guidance of Sir Peter Scott (Wildfowl and Wetlands Trust website).

Reservoirs can reveal previously unknown artefact scatters and even larger features as they gently wash formerly vegetated shores. Many of the known upland Mesolithic flint scatters known in the region have been discovered around the shores of reservoirs (Hosfield *et al* 2008, 55). In the dry summer of 1984, ten cup marked stones and concentrations of flint debitage dating to the Mesolithic and Neolithic periods as well as two greenstone axes were recorded on the shoreline of Stithians reservoir Cornwall during a period of very low water (Hartgroves 1987, 69-85). Channel 4's Time Team evaluated a complex prehistoric ritual landscape at Tottiford Reservoir in Devon, revealed when the lake was drained for maintenance (Dartmoor National Park Authority website).

Chesil Beach is a massive barrier formed from primarily glacial deposits behind which is a brackish lagoon known as the Fleet, the largest of its kind in Britain. The lagoon drains at its far southern end into Portland Harbour and the length of the feature gives rise to some interesting and unusual tidal and salinity phenomena since the tide, and therefore salt water, never reaches the northern end of the lagoon. This gives rise to some unusual species associations (Natural England website). Other notable lagoons include Loe Pool (Cornwall) and Slapton Leigh (Devon) which are highly valued for their wildlife and scenic value.

Frequent components of this Character Type include: military defences (e.g. pillboxes, anti-tank cubes, signal stations, fortifications, radar stations), maritime safety services (e.g. coastguard lookouts), navigation aids (e.g. lighthouses, fog stations, landmarks), specifically associated infrastructure and features related to industry (e.g. quarries, mines, lime kilns, railway tunnels), specifically associated infrastructure and features related to recreation (e.g. nature reserves, walk trails), specifically associated infrastructure related to fishing, and settlements.

VALUES AND PERCEPTIONS

Much of this Character Type is highly valued by locals and tourists alike and can form lasting impressions. Cornwall and its cliffs and dunes, Somerset and its wetlands and Dorset with Chesil Beach and its 'Jurassic Coast' cliffs, give each part of the region its own distinctive character. Buildings and structures related to sea views (e.g. lighthouses, military installations) are dotted along the cliff-line forming part of the historic seascape of the South West.

The South West coastline is incredibly varied and contains many unique landscapes and seascapes, perhaps none more so than those created by the serpentine rocks of the Lizard. The value of the Jurassic Coast of Dorset and East Devon is reflected by its World Heritage Site status. The region contains 18 stretches of Heritage Coast and much of the remainder falls within Sites of Specific Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), and RAMSARs (which are wetlands of international importance designated under the Ramsar Convention).

RESEARCH, AMENITY AND EDUCATION

In terms of amenity and educational purposes, cliffs and dunes in the South West are frequently visited by walkers, and others, using the South West Coast Path. The vegetation is itself of interest to many people, supporting insects, birds and mammals. Many people visit the more famous archaeological sites and could be encouraged,

where safe, to visit more. Footpaths from inland farms and settlements lead onto cliffs and dunes, demonstrating the links between this and other Types.

The science of palaeontology in England began at Lyme Regis with the discovery of a fossil *ichthyosaur* by a young girl, Mary Anning, in 1812 (Bryson 2003). The Jurassic Coast World Heritage Site in Dorset and East Devon recognises the part played by this region in the development of the science as well as its intrinsic value as a repository of fossils.

CONDITION AND FORCES FOR CHANGE

The condition of this Type is generally good; many sections of the region's coast are owned and managed by National Trust.

There are few forces for negative change beyond a minimal encroachment by farmers and an expansion onto certain cliffs and dunes of recreation facilities (e.g. caravan/chalet parks). The use of cliffs by long-distance walkers will continue to increase and so the Type will become more widely valued.

RARITY AND VULNERABILITY

In the South West this Type contains many unique components.

This Character Type is vulnerable to encroachment by caravan sites and other recreational activities such as golf courses. There are some problems of erosion which may be exacerbated by climate change.

PUBLISHED SOURCES

Bryson, B, 2003. *A short history of nearly everything*, New York: Random House

Cole, R, 2005. *The excavation of St Piran's Church, Perranzabuloe*, Truro: Cornwall County Council

Hosfield, R, Straker, V and Gardiner, P, 2008. Palaeolithic and Mesolithic, in C J Webster (ed), 2008, *The Archaeology of South West England, South West Archaeological Research Framework Resource Assessment and Research Agenda*, Taunton: Somerset County Council, 23-62

Hartgroves, S, 1987. The cup-marked stones of Stithians Reservoir, *Cornish Archaeology* **26**, 69-85

Nowakowski, J A, Quinnell, H, Sturgess, J, Thomas, C, and Thorpe, C, 2007. Return to Gwithian: shifting the sands of time, *Cornish Archaeology* **46**, 13-76

Rippon, S, 1996. Gwent Levels: evolution of a wetland landscape, *CBA Research Report* 105

Whimster, R, 1981. Burial practices in Iron Age Britain: a discussion and gazetteer of the evidence c700 BC –AD 43, *BAR Brit Ser* **90**, 2 vols, Oxford

WEBSITES

http://www.visitweymouth.co.uk/index.php?resource=287 (Visit Weymouth)

http://www.english-nature.org.uk/citation/citation_photo/1002654.pdf (Natural England - English Nature's 1986 Chesil Beach SSSI Citation)

http://www.wwt.org.uk/wetland-centres/slimbridge/ (Slimbridge)

http://www.dartmoor-npa.gov.uk/lookingafter/laf-culturalheritage/laf-archaeology/time-team (Dartmoor National Park Authority)

1.2.10.3 Character Type: Cultural Topography (Inter-tidal)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type refers to those aspects of cultural topography whose physical expressions are predominantly in the intertidal zone, including along estuaries. For HSC, the inter-tidal zone is perceptual at least as much as a matter of technical definition: the relationship between the actual extent of the perceived 'inter-tidal' zone and the levels of Mean High Water and Mean Low Water will vary from place to place due to many factors. It includes saltmarsh, sandy foreshore, shingle foreshore, rocky foreshore, sandflats and mudflats.

The region's intertidal zone comprises a diverse range of sandy, silty, or rocky areas in the form of sandflats and mudflats, sandy or rocky foreshores, and areas of saltmarsh. These can contain prehistoric and historic remains which are vital to enable a deeper understanding of the region's long-term relationship with the sea and those maritime cultural influences that have influenced today's character. These prehistoric and historic remains can either be found at the surface of this Character Type (e.g. quays, breakwaters, industrial workings), buried beneath it (e.g. old land surfaces), or sometimes in both (e.g. wrecks).

One of the distinguishing attributes of this Character Type is that many of the often isolated South West foreshores that today are used unintensively for leisure and recreation were once busy with the activities of farmers removing seaweed and sand to manure and improve their fields, the hubbub of the various components of the lime industry, bait-gatherers, and fossil collectors, amongst others. Fishermen might be present in large numbers drying and repairing their nets.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

This Character Type can be extremely mobile, as shown in the variability of, for instance, the course of the River Parrett over an historical time frame. A study of four islands in the mouth of the Parrett using documentary, hydrographic, and cartographic evidence showed that since the early 18th century two had become part of the mainland, one no longer existed, and one had become two islands (McDonnell 1995, 71). Rising sea levels may also account for sediment mobility and it has been estimated that erosion of the mud flats in Bridgwater Bay may be occurring at the rate of c0.016m per year, ensuring that more archaeological remains in the form of fish traps appear from the mud each year (Brunning 2007). The western and southern coasts of the region are more exposed and sandflats and mudflats are restricted to relatively small, less dynamic estuaries in comparison to the Severn. Nevertheless, they form important components of the historic landscape/seascape, many of the estuaries in Cornwall and West Devon having been particularly active in the mining and lime production industries. These activities have shaped sediment deposition within the estuaries and even led to the creation of new beaches as at, for instance, Carlyon Bay, St Austell. Massive quantities of sediment have also been carried down streams and rivers from inland mines enhancing estuarine sediment deposition.

The South West, with its long and in places heavily indented coastline, has a large number of isolated bays and stretches of sandy foreshore that are not visited intensively enough to be characterised as 'Leisure beaches'. These will have been used more intensively in the past. The use of seaweed as a source of soda and potash for the manufacture of glass, soap, and bleach was particularly important on the Scillies where, from the late 17th century to 1834 seaweed was burnt in custom-made 'kelp pits'. The resulting soda ash was then shipped off up the Bristol Channel and Severn Estuary to manufacturing centres around Bristol. Elsewhere, seaweed was removed from beaches to manure agricultural land, being a particularly valuable source of trace minerals in addition to potash. In places, for instance at Polridmouth near Fowey, tracks have been worn or quarried through rock outcrops on the foreshore to allow for the passage of carts carrying seaweed and/or sand.

Wrecks or hulks of ships and boats can survive on sandy foreshores and rocky headlands but, in the latter, they will mainly be fragmented. Craft abandoned in the gentler situation of estuaries, on mudflats and saltmarsh, may well be better preserved. After falling out of use in early 20th century many Severn trows were used to protect river banks by beaching them and filling with mud (Green 1995). The narrow bank between the Sharpness Canal and the River Severn to the north of the Severn Railway Bridge has long been used as a graveyard for old barges and other boats – the Purton Hulks - with the aim of protecting the bank from erosion by the strong currents in the river.

Fig 41 Saltmarsh at Exton, River Exe, Devon (©Copyright Derek Harper and licensed for reuse under this Creative Commons Licence)

There are many areas of saltmarsh in the region's estuaries, particularly along the edges of the Severn where it comprises 7% of the intertidal area. This figure is likely to have been higher in the past but hard flood and erosion defences along estuary sides and in some cases land reclamation has squeezed this type and diminished its capacity to absorb fresh accretions of sediment (SECG 2010, 28 38).

Bait-digging has occurred throughout the 20th century on the siltier and muddier stretches of the inter-tidal zone. This may affect buried archaeological features and deposits. The collection of peeler crabs has also been prevalent in the South West, particularly in the estuaries of Devon and Cornwall: in many cases large numbers of traps in the form of guttering and car tyres have been illegally emplaced with consequent effects upon the visual nature of historic landscape/seascape (Crab sheltering devices web page).

Typical components of this Type include palaeolandscapes, often in the form of peat deposits. Intertidal peat deposits in the Isles of Scilly, for example, formed in a saltmarsh environment, have been dated to the Middle Bronze Age and Late Iron Age while subtidal deposits from a freshwater, wooded environment have been dated to the Late Mesolithic (Charman *et al* forthcoming). There are also Neolithic trackways such as the Post Track and Sweet Track in Somerset, dated, dendrochronologically, to 3838 BC and 3807/3806 BC respectively (Pollard and Healy (eds) 2008, 75).

Most features within this Character Type are by-products of the use of the coasts and estuaries for fishing, shipping and industry, such as quays, piers or fish-traps, commonly now abandoned and visible only as low footings of walls or lines of decaying

or fragile timbers or stakes. Wrecks or hulks of ships and boats can survive on sandy foreshores and rocky headlands but, in the latter, they will mainly be fragmented.

VALUES AND PERCEPTIONS

This character type is highly valued, both ecologically and as a leisure resource. Large areas of the intertidal zone have been designated as National Nature Reserves (NNRs) as, for instance, at Bridgwater Bay, where the second highest tidal range in the world exposes vast areas of saltmarsh, sandflats, and mudflats. Other parts of the coastline may hold geological value as at the Axmouth to Lyme Regis Undercliffs NNR where large quantities of fossils may be found eroding from the cliffs. Lesser designations abound around the region's coastline.

In the South West, the foreshore is also valued as a place for recreational activities such as fishing, sunbathing and sea-bathing. Many of the activities associated with 'Leisure beaches' may be enjoyed less intensively throughout this character type.

Foreshores have been regarded as transitional areas between land and sea. Intertidal studies have often been encouraged from a maritime archaeology point of view due to the richness they represent from a historic environment perspective (see Fulford *et al* 1997). Perspectives that integrate 'land' and 'maritime' understandings would be highly beneficial to shed new light about past human activities within this Character Type.

A large proportion of this character type is designated as Sites of Specific Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), and Ramsar Sites (which are wetlands of international importance designated under the Ramsar Convention). Ramsar sites include the Severn Estuary, the Isles of Scilly, the Exe Estuary, Chesil Beach and The Fleet, and Poole Harbour. The stretch of coastline, including the foreshore, between Exmouth and Studland Bay is designated a World Heritage Site due to the richness of the fossil record in this area, as well as its place in the history of palaeontology. At least four National Nature Reserves include intertidal deposits within their remit: Bridgwater Bay, Dawlish Warren, Slapton Leigh, and Axmouth to Lyme Regis Undercliffs.

RESEARCH, AMENITY AND EDUCATION

A small amount of survey, excavation and analysis of well-preserved archaeological sites has been undertaken in the region providing valuable information about past human activities. Examples include studies of fish traps in Bridgwater Bay (Brunning 2007) and the middle of the Severn Estuary (Allen 2004).

The *Friends of Purton* are keen to promote the collection as a site of regional, national and international importance which can be enjoyed by both the local community and the world wide academic fraternity alike.

The Phase 1 seek-based study of A Rapid Coastal Zone Assessment Survey (RCZAS) has been taken carried out for the Severn Estuary which provides a record of all known archaeology in the intertidal zone and its immediate hinterland; an assessment of current erosion patterns and the threat to the archaeological resource; and an overview of coastal change from the Palaeolithic to the present day (Mullin *et al* 2009). This has included mapping of air photos by the NMP (Crowther and Dickson 2008). NMP mapping of the intertidal zone was also completed for the Isles of Scilly RCZAS (Johns *et al* 2004) and Phase 1 of another RCZAS is currently being undertaken for Dorset with the NMP mapping completed (Royall forthcoming).

Intertidal peat deposits are a valuable resource. Peat in the Isles of Scilly, formed in a saltmarsh environment, have been dated to the Middle Bronze Age and Late Iron Age while subtidal deposits from a freshwater, wooded environment have been dated to the Late Mesolithic (Charman *et al* forthcoming).

The South West's coastlines are invaluable from both historical and natural environment perspectives and have a strong amenity function with parts of the South West Coast Path running through this type.

CONDITION AND FORCES FOR CHANGE

The 'softer' coastlines of our major estuaries and of the south coast have a more complex and vulnerable archaeology than that of the rockier coasts. The combined effects of sea-level rise and salt marsh erosion may result in a rapid loss of sites in such situations (English Heritage 2003). It has been estimated that erosion of the mud flats in Bridgwater Bay may be occurring at the rate of *c*0.016m per year, resulting in the continuous exposure of, for instance, fish traps (Brunning 2007). Predictions for the future of the Severn Estuary indicate a net loss in intertidal habitat as mudflats, sandflats, and saltmarshes are lost in the middle and outer estuary whilst small gains are made within the inner estuary. It has been estimated that the English side of the Severn lost 21% of its saltmarsh between 1946-8 and 2000 (SECG 2010, 24, 36). Several schemes to allow formerly reclaimed land to revert to saltmarsh, with the aim of promoting wildlife and mitigating the effects of sea level rise have already proceeded including one in Cornwall on the Camel Estuary (BBC website). The management decision not to repair the natural breaching of a shingle bar at Porlock has also resulted in saltmarsh creation (The National Trust 2008).

The Coastal Access provision under the Marine and Coastal Access Act 2009 will be a force for change affecting this Character Type and public perceptions of it. Increasing pressure from visitors and watersports enthusiasts with associated car parking etc are also pressures on the intertidal zone.

A large proportion of this character type is designated as Sites of Specific Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), and Ramsar Sites (which are wetlands of international importance designated under the Ramsar Convention). Ramsar sites include the Severn Estuary, the Isles of Scilly, the Exe Estuary, Chesil Beach and The Fleet, and Poole Harbour. The stretch of coastline, including the foreshore, between Exmouth and Studland Bay is designated a World Heritage Site due to the richness of the fossil record in this area, as well as its place in the history of palaeontology. At least four National Nature Reserves include intertidal deposits within their remit: Bridgwater Bay, Dawlish Warren, Slapton Leigh, and Axmouth to Lyme Regis Undercliffs.

RARITY AND VULNERABILITY

This Character Type is found all around the coastline of the South West region. The Type is vulnerable coastal squeeze and coastal defence policy and to activities such as bait digging, including crab trapping, and recreational disturbance in the form of, for instance, increased wash from more frequent and larger boats. The gentler shores of the region are also vulnerable to potential sea level rise as a result of climate change. Expansions of ports and harbours and renewable energy installations and their associated cabling and pipelines could also put pressure on this Type.

PUBLISHED SOURCES

Allen, J R L, 2004. Fishtraps in the Middle Severn Estuary, *Arch Sev Est* **15**, 31-48

Brunning, R, 2007. A millennium of fishing structures in Stert Flats, Bridgwater Bay, Inner Bristol Channel, *Archaeology in the Severn Estuary* **18**, 67-83

Charman, D, Johns, C, Camidge, K, Marshall, P, Mills, S, Mulville, J, and Roberts, H M, forthcoming. *The Lyonesse Project: a study of the evoloution of the caoastal and marine environment of the Isles of Scilly*, Truro: Cornwall Council and English Heritage

Crowther S, and Dickson, A, 2008. *Rapid Coastal Zone assessment Survey for the Severn Estuary: Archaeological Aerial Survey, National Mapping Programme Report*, English Heritage and Gloucestershire County Council

English Heritage, 2003. *Coastal Defence and the Historic Environment*, English Heritage

Green, C, 1995. Trows and the Severn Coastal Trade, *Archaeology in the Severn Estuary* **6**, 97-113

Fulford M, Champion T, Long A, eds. 1997. *England's Coastal Heritage: A Survey for English Heritage and the RCHME*. *RCHME/EH Archaeological Report* **15**. London: EH/RCHME

Johns, C, Larn, R, and Tapper B P, 2004. *Rapid Coastal Zone Assessment for the Isles of Scilly*, Historic Environment Service (Projects), Truro: Cornwall County Council

McDonnell, R, 1995. Island evolution in Bridgwater Bay and the Parrett Estuary: an historical geography, *Archaeology in the Severn Estuary* **6**, 71-83

Mullin, D, Brunning R, and Chadwick, A, 2009. *Severn Estuary Rapid Coastal Zone Assessment Survey: Phase 1 Report for English Heritage*, English Heritage

Pollard, J and Healy, F, (eds) 2008. Neolithic and Early Bronze Age in C J, Webster, ed, *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council, 75-102

Royall, C, forthcoming. *Rapid Coastal Zone Assessment Survey for South West England – South Coast Dorset, Component One; Results of National Mapping Programme*, Truro: Cornwall Council

Severn Estuary Coastal Group (SECG), 2010. *Severn Estuary SMP2 Review. Appendix C: Baseline Understanding of Coastal Behaviour and Dynamics, Coastal Defences and Baseline Scenario Report*

The National Trust, 2008. *Shifting shores in the South West. Living with a changing coastline*, The National Trust

WEBSITES

http://www.ukmarinesac.org.uk/activities/bait-collection/bc13.htm (Crab sheltering devices web page)

http://news.bbc.co.uk/1/hi/england/cornwall/6563925.stm (Salt marsh recreation of the Camel estuary)

http://www.nationaltrust.org.uk/main/w-coastal-issues.pdf (National Trust's report, Shifting shores in the South West)

http://www.gloucesterdocks.me.uk/canal/graveyard.htm (Purton Barges)

http://www.friendsofpurton.org.uk/ (Purton Barges)

1.2.10.4 Character Type: Cultural Topography (Marine)

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type refers to those aspects of cultural topography whose physical expression is predominantly seaward of Mean Low Water (MLW) and includes sediment plains, mud plains, sand banks and exposed bedrock.

Much of the surface geology of the seabed offshore from the north Somerset and north Devon coasts and the western Bristol Channel, and thence more localised around the north Cornish coast, off the north coast of West Penwith, off the Lizard and south-east Cornwall, and over 50km out into the English Channel, comprises gravelly deposits characterised as Coarse Sediment Plains. These are important economically as fish spawning grounds and a habitat for commercially-exploited fish species.

The seafloor in the centre of the Bristol Channel, in Barnstaple Bay, around the bulk of the south Cornish and Devon coasts comprises sandy deposits characterised as Fine Sediment Plains. These areas can be important as spawning grounds and habitats for particular commercially-exploited fish species such as flatfish.

Muddy deposits are found either side of the mouth of the Bristol Avon, at the mouth of the Parrett, and the southern part of Barnstaple Bay. These can support a range of commercially-exploited shellfish species, including *nephrops spp*. (Langoustines/Dublin Bay prawn).

Mixed Sediment Plains comprise a mixture of sediments and are found throughout the area of the South West.

The far west of the western English Channel and the area south from here to the continental shelf is dominated by sand waves which diminish to the east as tidal flows strengthen. At the western extremity they are extremely large, forming ridges up to 7m high, 1km apart and 5km long, and are indicative of very low sand mobility (Evans 1990, 78-81). They can be spawning grounds and habitats for various commercially-exploited fish species including flatfish and shellfish.

Exposed bedrock is rare in the Bristol Channel other than around the upper Severn Estuary above the mouth of the Avon but is found in the area off the mouth of the Camel, off the north and west coasts of West Penwith, around the Scillies, and off Start Point. An area 150km west-north-west of the Isles of Scilly known as Haig Fras is a shoal comprising three granite masses characterised by incisions along joint planes with the most heavily eroded resembling the tors of Cornwall and Dartmoor. Other, smaller exposures occur at The Wolf Rock, Epson Shoal, Seven Stones Reef, and Eddystone, where bedrock breaks the surface of the surrounding submarine plains (Evans 1990, 12). Variation in depth and surface irregularity of the bedrock exposures will correspond with the dangers they pose to shipping. Bedrock exposures are liable to snag fishing gear and may figure as 'rough' or 'catchy' areas in fishing ground perceptions. Their potential hazard to shipping may increase wreck debris to be found in this Sub-character Type.

This Character Type varies considerably in the UK continental shelf, its variability being linked to the potential for survival of prehistoric and historic features within it. Understanding this Character Type will enable an assessment of its archaeological as well as its historic character. For example Lizard Point is a headland with high-energy sea conditions. It is characterised by a rocky foreshore with a rapidly dropping bathymetry, creating overfalls off the tip of the Lizard. Hence, Lizard Point is therefore considered as having a high potential for ship losses based on the combination of rocky foreshore, potentially dangerous sea conditions, and overfalls. The seabed around the headland is bedrock, producing a very low potential for preservation of archaeological material due to its rocky nature. This would encourage scattered preservation within gullies rather than the presence of large segments of wreck material, as is the case with the *Royal Anne* Galley, wrecked off Lizard Point in 1721 (Camidge *et al* 2006).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Variations in seabed topography and composition are influenced by the structure and composition of underlying bedrock, the configurations and composition of features originating at former terrestrial and submarine ice-sheet margins, carbonate biological sedimentary input and by the interactions of all these with the near-bed currents (Holmes *et al* 2004).

Processes such as glaciation, climate change, and the fluctuation of sea levels over the last 2 million years contributed to the deposition of sand and gravels which now lie on the seabed (Gubbay 2005). Many of these materials were originally deposited by rivers systems that are now submerged (BMAPA 2000; ODPM 2005). A series of three submerged cliff lines, at 38m-49m, 49m-58m, and 58m-69m below OD, can be found off the south west peninsula, representing previous sea levels. The submerged river channels associated with the rias of south Devon appear to extend to the base of the upper of these cliff lines which would appear to make them contemporary. Further west the submerged channels of the Fal and Helford have infilled with sediments and these have depths of up to 56m below OD. In Mount's Bay peat from a buried channel at 32m below OD has been radiocarbon dated to 12070±80 BP (SRR 3022) (Evans 1990, 11).

A similar feature is represented by Hurd Deep, an elongated depression running for 150km from east-north-east to a point 75km to the north of Brittany. This feature, up to 240m deep, is filled by Quaternary deposits up to 137m thick. Its origins are not fully understood but present theories tend to involve the catastrophic release of glacial lake waters or the breaching of the chalk barrier across the Straits of Dover, scouring the Deep out in a single event (Evans 1990, 75). Hurd Deep has been used in more recent times as a dumping ground for chemical and conventional munitions following the First World War and the disposal of ordnance and equipment seized from the German occupiers of the Channel Islands following the Second World War. Between the end of the war and 1973 low level radioactive waste was also deposited there (Wikipedia).

Smaller deeps occur off the Lizard and Portland whilst 60km off the north coast of Cornwall lies the southern edge of the Celtic Deep, which contains glacial clays (Evans 1990, 75).

VALUES AND PERCEPTIONS

Much of this Character Type is home to a rich diversity of marine life. For instance, sandy areas can be host to eel grass which supports a large number of crustaceans and fish, including sand eels, which in turn attract a large number of predators extending to commercially valuable fish species and wildlife attractive to tourists such as cetaceans, seals, and seabirds. Reefs provide an anchor point for a variety of species that also attract commercial fish species and tourist-friendly wildlife.

The South West boasts an abundance of these habitats, the reefs off the Scillies and west Cornwall in particular attracting commercial and charter fishing and wildlife watching tours.

Marine archaeologists and wreck salvors are also attracted to rock outcrops as they have, for obvious reasons, a greater number of shipwrecks in their vicinity. The Scillies and the Manacles in Falmouth Bay are popular destinations for professional and leisure divers.

Special Areas of Conservation (SACs) are designated to protect habitats and species listed on the European Union's Habitats Directive. There are a number of marine SACs within the region including Severn Estuary, Lundy, Land's End and Cape Bank, Lizard Point, Fal and Helford, Prawle Point to Plymouth Sound and Eddystone, Lyme Bay and Torbay. Haig Fras, 150km west north-west of Scilly, is a candidate SAC. The Marine and Coastal Access Act 2009 makes provision for the creation of a network of Marine Conservation Zones (MCZs).

RESEARCH, AMENITY AND EDUCATION

This type is extensively used for fishing, diving, wildlife watching and the region gains considerable amenity and educative benefits from hosting these activities.

Bournemouth University's 'Navigational Hazards' project aimed to use the UK's extensive hydrographic archives, including charts, sailing directions and pilotage notes, and modern seabed geology mapping to identify and map Areas of Maritime Archaeological Potential (AMAP), areas where high potential for shipwreck losses coincide with areas of high preservation potential (Merritt *et al* 2007).

The designation of parts of the region's offshore areas as Special Areas of Conservation allows for a degree of surveillance of the habitats and species of those areas (JNCC website). This might allow for a degree of historical information to be collected.

There are many submerged forests around the South West coast, that in Mount's Bay, Cornwall being a well known example. These are widely valued for their paleoenvironmental potential and as tangible evidence of ancient sea level rise. In 2005 a submerged forest was discovered in 6m of water off St Mary's, Isles of Scilly. Samples have been radiocarbon dated to the late Mesolithic period, 5,000-4,000 BC, a

charcoal peak suggesting the clearance of oak, birch and hazel woodland by fire (Charman *et al* forthcoming).

Fig 41 Diver Todd Stevens with a willow tree stump recovered from the submerged forest off St Mary's, Isles of Scilly. (Reproduced with kind permission of Carmen Stevens.)

CONDITION AND FORCES FOR CHANGE

Human forces for change include conservation offshore wind farms, tidal barrage schemes, and aggregate extraction areas amongst others. The impact of these activities as well as the movement of water and sediments could have an impact on this Character Type, potentially disturbing any historic features within it. Changes in tidal flows and currents can expose or cover palaeolandscapes and sites with a risk of potential damage or loss of visibility. Conservation pressures to move to a more sustainable fishing industry are also a force for change specifically on reducing damage to sea floor habitats from bottom-trawling (cf Lyme Bay).

RARITY AND VULNERABILITY

In terms of vulnerability, this Character Type is affected by environmental processes such as erosion, sea level change, and global warning and by human activities such as intrusive fishing activities (e.g. trawling) and offshore developments (e.g. wind farms, tidal barrages, and aggregate extraction). The impact of these activities as well as the movement of water and sediments could damage the potential prehistoric and historic features present within this Character Type.

PUBLISHED SOURCES

BMAPA. 2000. *Aggregates from the Sea. Drawing Strength from the Depths*. London: BMAPA

Charman, D, Johns, C, Camidge, K, Marshall, P, Mills, S, Mulville, J, and Roberts, H M, forthcoming. *The Lyonesse Project: a study of the evoloution of the caoastal and marine environment of the Isles of Scilly*, Cornwall Council and English Heritage, Truro

Camidge, K, Johns, C, and Rees, P, 2006. *Royal Anne Galley Marine Environmental Assessment: Phase 1 Desk-based Assessment*, Historic Environment Service, Cornwall Council, Truro

Evans, C D R, 1990. *The geology of the western English Channel and its western approaches*, London: British Geological Survey United Kingdom Offshore Regional Report

Gubbay, S, 2005. *A Review of Marine Aggregate Extraction in England and Wales 1970-2005*, Report for The Crown Estate

Holmes, R, Bulat, J, Henni, P, Holt, J, James, C, *et al*, 2004. *DTI Strategic Environmental Assessment Area 5 (SEA5): Seabed and Superficial Geology and Processes*, British Geological Survey Report CR/04/064N

Merritt, O, Parham, D, McElvogue, D, 2007. *Enhancing our Understanding of the Marine Historic Environment: Navigational Hazards Project Final Report*, Bournemouth: Bournemouth University on behalf of English Heritage

ODPM, 2005. *Marine Mineral Guidance 1: Extraction by Dredging from the English Seabed*

WEBSITES

http://en.wikipedia.org/wiki/Hurd's_Deep (Wikipedia - Hurd's Deep)

http://www.jncc.gov.uk/ (Joint Nature Conservation Committee)

1.2.11 Broad Character: Woodland

1.2.11.1 Character Type: Woodland

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

This Character Type mainly comprises the often unmanaged remnants of woodland formerly traditionally managed through coppicing (harvesting wood by cutting trees back to ground level) and pollarding (harvesting wood cutting trees at about human head height to prevent new shoots being eaten by grazing species such as deer). In the west these woodlands are usually found in the steep-sided valleys extending inland from rivers and along the banks of the rivers themselves, particularly in the rias of south Cornwall and south Devon. Other heavily wooded areas can be found in the lower Wye Valley and in the Forest of Dean. The Type also incorporates plantations, which during the 20th century, were created by re-planting many of the ancient woods with conifers. Additionally, new areas, particularly on moorlands in the South West, have been planted with conifers.

Today, the South West contains 20% of the ancient woodland of England (Forestry Commission website). Despite this the region has one of the lowest proportions of tree cover in England, and this is especially true of Cornwall, its least wooded county. The reasons for this are unclear; it may be in part be due to the exposed character of much of Cornwall but it is also likely to have been influenced by man's activities – by grazing pressure and possibly by the high levels of wood required for the exploitation of tin during much of the medieval and early post-medieval periods (Gilg 1999).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Ancient woodland is formally defined as land that has had continuous woodland cover since at least 1600 AD (Natural England website). There are two main varieties: 'ancient semi-natural woodland' - ancient woodland sites that have retained the native tree and shrub cover that has not been planted, although it may have been managed by coppicing or felling and allowed to regenerate naturally; and 'Ancient replanted woodland' - ancient woodland sites where the original native tree cover has been felled and replaced by planting, usually with conifers and usually during the 20th century.

The surviving ancient woodlands would have been managed and have formed important elements of the working landscape for many centuries; some probably from prehistoric times (see Rackham 1976 for discussions of typical uses and processes and Rackham 1986, 62-7). Certainly, medieval farmers and craftsmen would have exploited them as

pasture grounds (underwood), sources of fuel, coppice wood (including barking of oak for the tanning industry) and timber. Communities in mining regions would also have had close relationships with woods, again from at least the medieval period, needing both timber (trunks and main branches for structures and props) and charcoal (for smelting). Woodlands were gradually lost to agricultural clearing and enclosure (as well as other minor uses) on the less steep valley sides from the later medieval period into the 19th century. Few valleys, however, lost their tree-cover entirely. Many Domesday (1086) estates had extensive areas of woodland and there are also numerous later medieval references to woodlands. The steep-sided valleys in which most ancient woodland is found often formed estate and parish boundaries (the stream or river usually being the precise bound). Woodlands are therefore often on the least often visited margins of holdings. Even exposed coastal locations have tracts of ancient woodland, including Dizzard Cliffs in North Cornwall, where an oak forest grows, stunted by exposure to the Atlantic winds. Even here, tracks through the woods indicate that not all of the wood was out of reach.

There are substantial woodlands in the lower Wye Valley and these have been managed for millennia as wood pasture, coppice, and standards. The Wye Valley is interesting as it contains both alkaline and acid soils, which sustain very different tree species. Oak and hazel dominate the acid soils, whilst beech, limes, and ash prevail on the alkaline. A key indicator of the age of the alkaline woods is the lime since it does not set seed well and is therefore absent from woodland that has been clear felled in recent times.

The nearby Forest of Dean has been much more intensively exploited for its timber since at least the Roman period, due in no small part to its well-developed and ancient iron extraction and processing industry. Many charcoal burners were at work here in the medieval period and 50 were recorded in 1279 working in the forest; in 1282 the remains of nearly 3000 hearths were observed. The number of the iron forgers, the portability of their working equipment, and their close association with the charcoal burners was claimed to cause widespread destruction (or management) of the forest and complaints were frequent (Birrell 1980), although this is contested as a true cause of woodland destruction by Rackham (1976) because managed woodland could supply the forgers' needs. By the mid 17th century Henry Powle could say that 'the ground is naturally inclined to wood, especially Hazel and Oak; of which last sort it hath produced formerly most stately Timber; though now, almost totally devoured by the increase of the Iron-Works' (Powle 1677-8, 931).

In Devon and Cornwall much of the woodland is confined to the ria valleys and the steep-sided valleys upstream. Many of these woodlands are ancient and contain evidence of coppice stools, charcoal-burning, and leats. Demand for timber has been driven largely by agriculture, the construction, and shipbuilding industries. In Cornwall and west Devon some post-medieval demand may have come from the mining industry although the majority of wood used for pit props and construction appears to have been imported from the Baltic, at least from the 19th century (Graeme Kirkham pers comm.). It is likely that the pine used in the construction of Brunel's wooden viaducts for the mainline railway in Cornwall used timber imported from the Baltic (Booth 1976). However, demand for charcoal for smelting and other associated activities will have been high until the widespread adoption of coal and coke as fuel. Local wood is likely to have been used in the papermaking industry, which in the 17th and 18th centuries grew to produce up to 10,000 tons by 1800. Water-powered paper mills in the region, with the exception of one at Barnstaple, were clustered around the valleys of the Fal, the Tamar, and the Exe (Havinden 1999).

Concern over the shortage of standards to build new ships has occurred throughout the history of England. In 1543 the Statute of the Woods was passed, the main provision of which was that in all woods that were coppiced at least twelve standards of oak (or elm, ash, aspen, or beech) should be left to grow into timber (Nisbet 1906). The Forestry Commission was established in 1919 following concern after the First World War that the country was facing a timber shortage. Some of the first plantations were

established in Devon in the 1920s (Gilg 1999). Many of the 20th century plantations were established on inland moors that were formerly rough ground but a significant number were established on the sites of ancient woodland. These are relatively rare and tend to occur inland (Cornwall County Council 1996).

VALUES AND PERCEPTIONS

Woodland is widely appreciated and is seen by many as the natural climax vegetation for the majority of the British Isles. The English, in particular, have a cultural affinity for the oak, and it is seen by many as a symbol of English and British naval power from the 16th century onwards. They are venerated for a cultural sense of their antiquity but also as a useful resource (Daily Telegraph website). Such cultural respect for trees also creates a sense of loss for many when an area of woodland is redeveloped, trees often forming an iconic focus for direct action in moves to resist major developments such as new road schemes.

The coherence of its components is good as is evidence for time-depth and the Type contributes much to the general landscape character. Semi-natural ancient woodlands are also considered to be of great importance for wildlife because they have had a long time in which to acquire a diversity of species and to form stable floral and faunal communities.

RESEARCH, AMENITY AND EDUCATION

Woodlands, from the 20th century, have been rather neglected areas, and for much longer they have been places on the edge of the cultural consciousness, liminal areas, possibly due to a lack of internal visibility and difficulties of movement within them. As such they have often been a focus for cultural myths and legends, tales of strange beasts and other dangers. They contain a relative paucity of large prestige sites, although many woodlands, particularly recent plantations, contain some impressive prehistoric fortified sites. Many also have the potential to contain well-preserved historic features, few having received any thorough archaeological survey.

Plantations are of importance in terms of contribution to the present landscape character and amenity value. Overall, however, their historical value is now quite low.

CONDITION AND FORCES FOR CHANGE

Timber prices have been falling since 1974 whilst costs have increased, so profitable management of woodland is becoming more difficult (Forestry Commission 2005).

Woodlands are culturally defined and the products of cultural management, and they are culturally perceived, valued and used. Prominent among those values as a concern to guide future woodland management is their role as ecological habitats and the biodiversity levels they embody. Major cultural issues, such as the cessation of traditional management techniques (e.g. coppicing and pollarding), sheep grazing, planting of conifers, lack of opportunities for woodland regeneration and invasion of non-native species, are seen as reducing biodiversity levels from their potential in managed broad-leafed woodland.

Increasing pressure for expansion of woodlands in England is a force for change and offers an opportunity to strengthen the distinctive historic cultural character of the places affected if it is guided by an understanding of the known or likely areas of earlier woodlands. A change of policy by the Forestry Commission now favours restructuring plantations through their gradual transformation from conifer to broad-leaf (Forestry Commission 2005).

RARITY AND VULNERABILITY

In the South West region Coastal woodland is well represented along the southern coast of Devon and Cornwall where it contributes significantly to the seascape and landscape character.

It is vulnerable mainly to neglect, visitor pressure and climate change, although conservation management techniques are improving and becoming more widely implemented but organisations such as the National Trust who have many properties with coastal woodland.

PUBLISHED SOURCES

Birrell, J R, 1980. The Medieval English Forest, *Journal of Forest History* **24**, No. 2, 78-85

Booth, LG, 1976. Timber Works in Pugsley, A, ed, *The Works of Isambard Kingdom Brunel*, Institute of Civil Engineers; Cambridge: Cambridge University Press

Cornwall County Council, 1996. *Cornwall Landscape Assessment 1994*. Report prepared by CAU and Landscape Design Associates, Truro: Cornwall County Council

Forestry Commission 2005. *SW Regional Woodland and Forestry Framework 2005*

Gilg, A, 1999. Agriculture, Forestry and Landscape Conservation in the Twentieth Century', in Kain and Ravenhill, eds, 1999, 307-21

Havinden, M, 1999. The woollen, lime, tanning and leather-working, and paper-making industries c. 1500 – c. 1800, in Kain and Ravenhill, eds, 1999, 338-44

Kain, R, and Ravenhill, W, eds, 1999. *Historical Atlas of South-West England*, Exeter: University of Exeter Press

Nisbet, J, 1906. The history of the Forest of Dean, in Gloucestershire, *The English Historical Review* **21**, No 83, 455-9

Powle, H, 1677-8. An Account of Iron-Works in the Forest of Dean, Communicated by Henry Powle, Esquire, *Philosophical Transactions (1665-1678)* **12** (1677 - 1678), 931-935

Rackham, O, 1976. *Trees and Woodland in the English Landscape,* London: J M Dent

Rackham, O, 1986. *The History of the Countryside*, London: J M Dent

WEBSITES

http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm (Natural England's web page for its Ancient Woodland GIS dataset)

http://www.forestry.gov.uk/forestry/INFD-7BCJ6R (Forestry Commission)

http://www.telegraph.co.uk/earth/countryside/4863957/Hearts-of-oak-for-ever.html (Daily Telegraph)

1.2.12 Broad Character: Enclosed Land

1.2.12.1 Character Type: Reclaimed Land

Broad Character: Enclosed land

Character Type: Reclaimed land

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The 'Reclaimed land' Character Type refers to areas of land enclosed, drained and taken in from along the coast for a variety of mostly agricultural purposes. It does not include areas of land reclamation designed specifically for urban settlement or port expansion.

Many of the smaller parcels and blocks of reclaimed land in the South West are located in the upper reaches of the tidal rivers (e.g. Cotehele, Cornwall) or behind coastal barriers as at Lodmoor, Weymouth which is a natural shingle bar later re-enforced with a sea wall.

The more extensive areas of reclaimed landscapes are concentrated on the banks of the Severn Estuary where they are known as 'Levels'. These have been given a variety of names in the literature and the nomenclature used by Allen (2001) is followed in this text. The upper Severn Estuary contains small areas of reclaimed land known as the Elmore, Longney, Rodley, Arlingham, Awre, and Slimbridge Levels. As the estuary opens up below Berkeley we find the Berkeley Level on the south bank, the Lydney Level on the north. Between Aust and the northern bank of the River Avon are the Avon Levels, whilst to the south of the river is the Vale of Gordano. The area between Clevedon and the mouth of the River Axe to the south of Weston-Super-Mare is the North Somerset Levels, whilst to the south of the Axe are the Somerset Levels proper extending south to the River Parrett and inland along the Axe to the north of Glastonbury, the Brue to the south of Glastonbury, the Cary to the south of Street, the Parrett to Thorney Bridge and Ilchester via its tributary the Yeo, and the Tone to Taunton.

Elsewhere in South West smaller areas of reclaimed land are also found; most often associated with the former extent of shallow estuaries now entirely silted up or the shallower margins of extant ria systems. For example, in Cornwall, an area of reclaimed land (and wetland) surrounding Par was, in the medieval period, a navigable river estuary.

The drainage ditches are known as 'rhines' on the Avon levels north of Bristol (Barnes 1993, 5) or 'rhynes' in Somerset. Rippon has identified four landscape types relating to reclamation in the Severn Estuary Levels: Wentlooge Roman strip fields arranged in rectilinear blocks; an 'irregular landscape' consisting of small irregular enclosures and droveways utilising natural drainage channels on higher coastal areas and dating to the later Saxon period to the thirteenth century; a more 'regular landscape' formed of strip field enclosure within long, often sinuous, boundaries in lower areas; and very rectilinear enclosures relating to post medieval reclamation (Rippon 1993, 32-3).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Land reclamation prior to the Roman period is hinted at in the Avon Levels at Hallen where saltmarsh was succeeded by pasture in the Middle to Late Iron Age, probably supporting seasonal grazing in a stable and relatively dry environment, which was either the result of drainage or a lower water table (Fitzpatrick (ed) 2008, 132-3).

Fig 43 View of the Somerset Levels from Muchelney to Long Sutton. (Photograph; Graeme Kirkham.)

Early land reclamation is recorded at Nyland Hill, Somerset and Puxton Dolemoor, North Somerset where saltmarsh was reclaimed during the Romano-British period, the latter showing evidence that the drainage ditches carried tidal water. Larger scale reclamation work was undertaken in the mid 3rd century AD at Banwell and Kenn Moors in the North Somerset Levels and here the ditches contained only fresh water, as did a later phase of work at Puxton Dolemoor. The reclaimed land supported grazing for sheep and cattle and also the production of barley and wheat. At Kenn Moor there is additional evidence for the production of hay. It appears that the entire Roman reclaimed landscape did not endure beyond the late 4th century AD when saltmarsh recolonised the area (Straker *et al* 2008, 147).

There seem to have been designed differences in the ways that various areas were treated. The region between the Rivers Axe and Parrett was formerly divided by a now vanished river, named the Sigur by the Saxons. To the south the land was left as tidal saltmarsh and used for salt production, whilst to the north the marshes were reclaimed and farmed (Rippon 2000, 69-71).

There is also evidence for the reclamation of land in Gloucestershire on the Severn floodplain and although some of this may have been abandoned following repeated flooding episodes in the later 2nd century AD, other areas continued to be used. A ditched field system at Crook's Marsh Farm shows evidence for episodic flooding by sea water in the late 4th century but the overall picture seems to be one of stability and continuity throughout and beyond the Roman period (Straker *et al* 2008, 147-8).

By the tenth century small-scale reclamation of saltmarsh at Puxton, North Somerset was underway, and probably also throughout many parts of the Severn Estuary Levels (Rippon 1993, 32-3). However, the vast bulk of reclamation of saltmarsh and freshwater wetlands on the Somerset Levels and Severn Estuary spanned the eleventh to thirteenth century by which time the landscape had assumed much of its present form. The reclaimed land at Puxton was supporting meadows, pasture, and arable farming at this time. The schemes took the form of substantial embankments along coastal marshes and tidal rivers as well as drainage ditches (Straker 2008, 190). There is no evidence that the ditches contained tidal water during this period (Straker 2008, 190). The bulk of the reclamation works occurred during a period of rising populations and expanding markets and, despite the downturn in fortunes experienced following the Black Death of the mid 14th century, these areas continued to be used in contrast to some of the upland settlements of the time which were abandoned (Straker 2008, 193).

Smaller schemes were undertaken in the post medieval period such as that at Braunton Marsh in North Devon where saltmarsh was drained and enclosed, firstly between 1811-15, and then, less profitably in 1853-57 when the area of Velator and Wrafton Marsh was drained. The works involved re-routing existing channels and the constructions of new quays and mooring facilities. The profitability of the enclosure of these lands was further hit when the lands were cut through by the Barnstaple to Ilfracombe railway line in 1874. The reclaimed area was hit in 1910 by severe flooding which caused over £5000 worth of damage and resulted in the loss of almost all of the livestock on the marshes, and led to flooding on every tide until the breaches were repaired (Manning 2007).

In more recent times reclamation has been limited to landfilling marshy areas, principally in the 19th century, and examples can no doubt be found throughout the region. Probably very little land reclaimed in this way will have been used for agriculture since much of it will have taken place in or beside urban areas and developmental pressures will have driven subsequent land use. In Truro, a number of sports pitches at Boscawen Park are built on landfill-reclaimed river bank whilst landfilled-marsh downstream from Lostwithiel has been turned into a local nature reserve. The creation of a raised playing field on land at Turlin Moor, Poole Harbour has been carried out on land that had been used to dump huge quantities of waste ash from Hamworthy Power Station in the 1950s (Hamworthy Matters website). Earlier

reclamation at Poole saw the deposition of huge amounts of oyster shells (averaging 1m in depth, 40m in width and traced for a length of 100m) in the medieval period on which part of the town appears to have developed (Horsey and Winder 1991). Elsewhere in Poole Harbour a number of small-scale reclamations have taken place in historical times at, for instance, The Moors near Wareham. Over one third of the area of the Royal William Victualling Yard at Plymouth was built on land reclaimed from the sea using spoil from levelling the rest of the site.

This Type includes reclamation from sea, reclamation from tidal marsh, and reclamation from wetland.

VALUES AND PERCEPTIONS

All habitats are now seen to bear the imprint of man's management. In some places, reclamation for industrial, commercial and recreational uses, urban development and port and harbour infrastructure can be perceived as beneficial towards local, regional and national economy but detrimental towards natural and historic environments.

The Somerset Levels are valued nationally and by their local communities. Concerns about the depletion of the world's peat deposits have led to pressure on extraction companies to switch to more sustainable substitutes.

RESEARCH, AMENITY AND EDUCATION

The thick accumulation of sediments in the Avon Levels has ensured that the archaeology of the area is little known and is difficult to assess (Barnes 1993, 27). The Somerset and North Somerset Levels have been studied more intensively than elsewhere and there is a considerable body of literature on the subject (e.g. Allen 2001; Rippon 2000; 2006) but there is less widespread research in other areas.

The prehistoric trackways of the Somerset Levels are one of the best known archaeological landscape features in the region and emphasise that the reclaimed landscape presented to people's eyes reflects a very major environmental change from earlier periods.

CONDITION AND FORCES FOR CHANGE

Peat extraction continues on parts of the Somerset Levels as a distinctive current land-use within this Character Type but one under pressure from wider conservation concerns about the sustainable management of the world's remaining peat resources. Archaeological interests also see peat extraction as removing evidence of previous reclamations and also historical field patterns, although peat cutting is itself one more character episode in the sequence of change here, as was each phase of the field systems previously.

Recent plans to reflood parts of the Somerset Levels have raised concern about the loss of this industrial heritage, potential damage to the archaeological resource by increased root activity from wetland flora, and damage to the peats and clays by excavation of material to create bunds (Cox and Rackham 1993, 57-8).

Possible future impacts of climate change and rising sea levels include wetter conditions during the winter as higher tides prevent discharge from rhynes and drier conditions during the summer as the result of hotter weather. This will have an adverse effect on the preservation of organic-rich sediments and artefacts that contain information regarding past reclamation works.

RARITY AND VULNERABILITY

Globally the peat resource is rare, and there are concerns about the depletion of the resource by continued extraction, although the South West region is rich in that resource within this Type.

There is a continuing loss of local features and habitats caused by the destruction of traditional field systems, stone walls and hedge banks as well as the reclamation of

moorland and wetland. In the South West, rising sea level may also affect agricultural land which is currently located on reclaimed marshland.

PUBLISHED SOURCES

Allen, J, 2001. Sea level, salt marsh, and fen: Shaping the Severn Estuary Levels in the Later Quaternary (Ipswichian-Holocene) in *Estuarine Archaeology: the Severn and Beyond. Archaeology in the Severn Estuary* **11**, 13-34

Barnes, I, 1993. Second Severn Crossing: English Approaches, an interim statement on the 1992/93 fieldwork in *Archaeology in the Severn Estuary* **4**, 5-30

Cox, M, and Rackham, J, 1993. Survey of a derelict industrial landscape at Shapwick Heath, Somerset in *Archaeology in the Severn Estuary* **4**, 57-64

Fitzpatrick, A, ed, 2008. Later Bronze Age and Iron Age in Webster, ed, 2008, 117-44

Horsey, I P, and Winder, J M , Late Saxon and Conquest-period oyster middens at Poole, Dorset, in Good, G L, Jones, RH, and Ponsford, M W, eds, 1991, *Waterfront Archaeology: Proceedings of the third international conference on waterfront archaeology held at Bristol, 23-26 September 1988*, CBA Research Report **74**, 102-4

Manning, C, 2007. *Braunton Marsh Management Study*

Rippon, S, 1993. The Severn Wetlands during the historic period, *Archaeology in the Severn Estuary* **4**, 31-36

Rippon, S, 2000. Romano-British exploitation of coastal wetlands: North Somerset Levels, *Britannia* **31**, 69-200

Rippon, S, 2006. Taming a Wetland Wilderness: Romano-British and Medieval Reclamation in the Somerset Levels and Moors, in P Hill-Cottingham, D Briggs, R Brunning, A King, A, and G Rix, eds, *The Somerset Wetlands: An Ever Changing Environment*, Taunton: Somerset Archaeological & Natural History Society, 47-56

Straker, V, Brown, A, Fyfe, R, and Jones, J, 2008. Romano-British environmental background in Webster, ed, 208, 145-50

Straker, V, 2008. Post-Conquest Medieval environmental background in Webster, ed, 2008, 163-8

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework resource assessment and research agenda*, Taunton: Somerset County Council

WEBSITES

http://www.thisissomerset.co.uk/news/Peat-extraction-proposal-defended-despite-protest/article-2779019-detail/article.html (This is Somerset news article)

http://www.aboutmyarea.co.uk/Dorset/Poole/BH15/Community-Hubbubs/Hamworthy-Matters/112799-Turlin-Moor%22 (Hamworthy Matters)

http://www.ttef.org.uk/Study/BrauntonReportDigital.pdf (Braunton Marsh Management study 2007)

1.2.13 Broad Character: Unimproved Grazing

1.2.13.1 Character Type: Coastal Rough Ground

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

Coastal Rough Ground (CRG) includes various forms of very unintensively managed and often unenclosed land which characterise the coastal land periphery of many areas. Such coastal rough ground often contrasts with highly intensively managed areas

immediately adjacent inland but also, as a summer grazing resource, it forms an important and distinctive part of the coastal agricultural economy. It also frequently provides a refuge for rare and endangered ecological communities specific to coastal margins.

CRG can be found along much of the South West's coastline, becoming especially prevalent along the coastal margins in the far west. This Type is the product of thousands of years of human activity, particularly summer grazing and extractive industries. The South West Coast Path, from Minehead to Poole Harbour, runs through this Character Type along much of its route, parts of which can therefore be rather crowded during the summer months.

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Although often a vital economic resource, this land has been unintensively managed for much of its cultural history and the remains of past phases of activity will usually be less prominent or dense than in more productive areas, although often better preserved. Prehistoric sites will generally be limited to flint scatters, barrows, and, in the west, cliff castles. The north Cornish coast has, in addition, occasional Bronze Age cists and Iron Age to Early Medieval burial grounds, often within this Type, components of which may be seen as they emerge from the cliff section as a result of coastal erosion. The Isles of Scilly has an abundance of prehistoric field boundaries, entrance graves and cairn fields.

Prehistoric or medieval pasture boundaries or cliff edge walls often lie in this Type but many boundaries will be post-medieval in origin as a result of the enclosure of common land. Abandoned tiny flower and potato fields of post-medieval origin, bounded by granite walls and often created on terraces, can be found along the south coast of West Penwith.

Fig 44 Bulb fields at Tater Du, Penwith, Cornwall. (Photograph; Cornwall Council.)

The remains of, mostly post-medieval, quarries can be seen around the coast but particularly in the slates of north Cornwall and on the Isle of Portland. Industrial remains, especially mining features, are also locally abundant in this Type, particularly between Perranporth and Portreath, on the north coast of West Penwith, around Rinsey Head, St Austell Bay, and parts of the Dorset coast.

Military sites are often found on this Character Type, including look-outs, pill-boxes, batteries, radar stations and forts. There are also maritime safety sites such as coastguard look-outs, daymarks, and lighthouses, and, in Cornwall and South Devon, huers' huts from which shoals of fish were spotted. The latter used a complex system of semaphore signals using paddles, battens, or gorse bushes to guide boats to the pilchards (Bone and Dawson 2008, 239). The South West Coast Path itself builds on the historical network of paths that provided a means of allowing Revenue men to patrol the coast in the fight against smuggling, the cliff-hugging route a relic of the need to see into every secluded cove (South West Coast Path website). By the latter part of the 19th century the Coastguard Service was using lookout stations that communicated using storm-cones hung on flagstaffs (Bone and Dawson 2008, 239). Subsequent improvements in communications and radar have taken away the requirement for patrolling and even for the staffing of most Coastguard lookouts: many are now served by volunteers of the National Coastwatch Institution (NCI).

The Type was predominately grazed until the 20th century, forming a herb-rich grassland. However, grazing on much had ceased by the middle of the century leading to the scrub or heathland vegetation prevalent today (Cornwall County Council 1996; Dudley 2011; Kirkham 2011).

Fig 45 Coastal rough ground being grazed – Start Point, Devon. (Photograph; Cornwall Council.)

VALUES AND PERCEPTIONS

This Character Type provides that by which most people engage with and perceive both the landscape and seascape for most of the region's coastline. The presence of the South West Coast Path over much of this Type means that it is much visited and held in high regard by those that walk the path. Many tourist destinations including leisure beaches and caravan sites are located adjacent to it and it contributes strongly to the view for most coastal activities on land and sea. Much of it is in the ownership of the

National Trust, with enhanced visitor information available and attracting additional visitors, although much National Trust owned coastal farmland does not offer public access.

Many parts of the coastline will have been used as backdrops to television and film productions, such as Poldark and Wycliffe, and as such will be familiar to many who have never visited the region.

Most people, confronted by the tranquil and 'natural' appearance of this Type, will be unaware of its rich cultural history prior to the 20th century and whose imprints shape their experience of the Type today.

Many people also visit this Character Type for the ecological qualities that arise from its unintensive management: to see the diverse wildlife supported by the clifftop pasture, and a number of rare species, such as the Large Blue butterfly and the Chough, which rely on it as a habitat.

Many of the cultural imprints of coastal rough ground are expressed in the character of the vegetation and soil profile, coupled with a low density of built features. However where they do occur, typical components may include military defences (e.g. pillboxes, anti-tank cubes, Roman signal stations, fortifications, radar stations), prehistoric and historic sites, finds and field systems (flint scatters, barrows, coin hoards, settlements), maritime safety services (e.g. coastguard lookouts), navigation aids (e.g. lighthouses, fog stations, landmarks), industrial extraction and processing sites (e.g. quarries, mines, limekilns), recreational facilities (e.g. caravan and chalet parks, golf links).

RESEARCH, AMENITY AND EDUCATION

There is often considerable time-depth visible in this Type due to the excellent survival of monuments from the earliest times facilitated by the unintensive use of this land. Many visitors will be aware of the rich heritage on display here. Access is facilitated by the South West Coast Path which runs though it.

The HEATH Project was an innovative international environmental partnership which ran from 2004 to 2008 and had a particular focus on west Cornwall. It aimed at improving the management, understanding and interpretation of rough ground and increasing public use, appreciation and enjoyment of it. The project was particularly notable for an approach which integrated both the natural environment – typically the primary focus of 'environmental' activity – and the historic environment. Historic environment aspects of the project included archaeological survey, historic landscape characterisation, palaeoenvironmental analysis, research into the historic and cultural aspects of rough ground and educational and community outreach work. Products included two popular booklets (Dudley 2008; Kirkham 2008) and two monographs (Dudley 2011; Kirkham 2011) on the history and management of West Cornwall's rough ground.

CONDITION AND FORCES FOR CHANGE

This Type has been created by millennia of unintensive human management until the 20th century. Since then, management has often been by neglect with widespread disuse of the Type for grazing and other resource collection, such as the use of bracken for animal bedding, leading to the reversion of much of it to scrub or heath, replacing the previously dominant herb-rich grassland. Efforts are underway by the National Trust and other land managers to counter this by re-introducing grazing in some areas by ponies and goats.

Most of the archaeological components of this Type are well-preserved as a result of the unintensive use of marginal coastal land. However, the increase in scrub leads to a loss of visibility for many archaeological sites and a reduction in plant biodiversity.

The large amount of visitors to certain parts of the coast leads to locally severe surface erosion. Natural forces such as cliff erosion can lead to the loss of sections of this Type and this might be expected to increase if sea levels rise.

RARITY AND VULNERABILITY

Much of this Type is covered by various environmental designations and/or owned by the National Trust leaving a predisposition to environmentally sympathetic management. Encroachment by caravan sites and other recreational activity provides a moderate pressure for change overall, and locally a serious one. The major force for change to this Type is the encroachment of scrub and heathland due in part to lack of grazing and in part to deliberate management aimed at enhancing biodiversity through, for example, the re-establishment of western heath on the coastal margins of Cornwall and Scilly.

PUBLISHED SOURCES

Aldred, O, 2001. *Somerset and Exmoor Historic Landscape Characterisation Project 1999-2000*, Taunton: Somerset County Council and English Heritage

Bone, M and Dawson, D, eds, 2008. Post-Medieval, Industrial and Modern in Webster, ed, 2008, 213-68

Charman, D, Johns, C, Camidge, K, Marshall, P, Mills, S, Mulville, J, and Roberts, H M, forthcoming. *The Lyonesse Project: a study of the evoloution of the caoastal and marine environment of the Isles of Scilly*, Truro: Cornwall Council and English Heritage

Cornwall Council, 2012. *A future for Maritime Cornwall: The Cornwall Maritime Strategy 2012-2030,* Truro: Cornwall Council

Cornwall County Council, 1996. *Cornwall landscape assessment 1994*. Report prepared by CAU and Landscape Design Associates, Truro: Cornwall County Council

Dudley, P, 2008. *The archaeology of the moors, downs and heaths of west Cornwall,* Historic Environment Service, Cornwall County Council, Truro

Dudley, P, 2011. *Goon, hal, cliff and croft: the archaeology and landscape history of west Cornwall's rough ground,* Historic Environment, Cornwall Council, Truro

Hosfield, R, Straker, V and Gardiner, P, 2008. Palaeolithic and Mesolithic, in Webster (ed), 2008, 23-62

Kirkham, G, 2008. *Managing archaeology and historic landscapes on west Cornwall's rough round,* Historic Environment Service, Cornwall County Council, Truro

Kirkham, G, 2011. *Managing the historic environment on west Cornwall's rough ground,* Historic Environment, Cornwall Council, Truro

Land Use Consultants and Cornwall Archaeological Unit, 1996. *Isles of Scilly Historic Landscape Assessment and Management Strategy*, Truro: Cornwall County Council

Ratcliffe, J, and Straker, V, 1996. *The Early Environment of Scilly*, Truro: Cornwall Council

Turner, S, 2005. *Devon Historic Landscape Characterisation Phase 1 Report*, Devon County Council Historic Environment Service and English Heritage

Webster, C J, ed, 2008. *The Archaeology of South West England, South West Archaeological Research Framework Resource Assessment and Research Agenda*, Taunton: Somerset County Council, Taunton

WEBSITES

http://www.swcp.org.uk/content/south-west-coast-path (South West Coast Path)