Chapter 9
Researching, Conserving and Managing Submerged Prehistory: National Approaches and International Collaboration

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Introduction

In recent years research by several teams has greatly expanded our understanding of submerged prehistoric landscapes on the north-west European continental shelf. Although the focus of this chapter will be on north-west Europe, below we attempt to summarise provision for offshore prehistoric archaeological research, conservation and management elsewhere in the world. Archaeological material on the sea floor has been studied, dating from several glacial-deglacial cycles (Peeters et al. 2009). New methodologies adapted from industry and oceanography have been developed, involving marine-geophysical survey (bathymetric, sub-bottom and 3-D seismic), vibrocoring to ground-truth the geophysics and obtain sediment samples for dating and paleo-ecological analysis, with scientific trawling and grab sampling for the recovery of faunal remains and artefacts (Gaffney et al. 2007; Glimmerveen et al. 2004; Wessex Archaeology 2007: Tizzard 2010; Marine Environment Protection Fund/English Heritage 2009: see also www.alsf-mepf.org.uk). Over the same period, the British Museum's Ancient Human Occupation of Britain Project has demonstrated, from sites on the North Sea coast, that there was hominid activity before the latest polarity reversal at 0.78 Myr ago, and up to 0.99 Myr ago, above 45° north latitude in Europe (Parfitt et al. 2005 2010). In terms of managing submerged prehistoric landscapes in north-west Europe, one very significant consequence is that offshore Pleistocene paleo-geographic features and sediments which would formerly have been thought to be too 'early' to be archaeologically relevant are now seen

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Fig. 9.1 The 2010 excavations at Happisburgh by the Ancient Human Occupation of Britain Project as viewed from the adjacent cliff top. The discovery of a number of worked flint flakes, cores and associated biological remains from a stratigraphically secure deposit at the site suggests that early Pleistocene hominins were present in northern Europe >0.78 million years ago. (Photo courtesy of Peter Murphy, English Heritage)

as having the potential to provide further data on the spread of premodern humans northwards. Submerged sediments and features of around this date have already been defined by the seabed mapping of the British and Dutch Geological Survey and other national geological services (see also Wessex Archaeology 2006). Other features and deposits are the subject of recent research (Dix 2010). Some north-west European heritage agencies concerned with the conservation and management of the historic environment are therefore confronted not just with an increase in the geographical scope of their responsibilities (from their original terrestrial locus to offshore areas), but also a temporal extension back to almost 1 Myr. This comes at an awkward time given current economic constraints (Fig. 9.1).

Traditional forms of seafloor exploitation, notably beam trawling and shellfish dredging, have long been recognised as damaging to near-surface seabed sediments; but, ironically, much of our present knowledge of prehistoric artefacts and faunal remains from the seabed has come from these very activities. Some degree of damage to submerged deposits is inevitable and so the prime concern must be to minimise the loss of scientifically important information. In the Netherlands, for instance, there is a long history of collaboration between palaeontologists, archaeologists and fishermen (Glimmerveen et al. 2004), and a comparable reporting mechanism

is currently being trialled in England. Port developments have historically been damaging to the historic environment, in terms of land claim, on-shore construction and capital dredging for approach channels, but current developments are on a much larger scale than in the past. For example, archaeologists have been involved in mitigating the impacts of the extension of Rotterdam harbour in the Netherlands, and in England at Immingham, Felixstowe (East extension), Harwich (Bathside Bay), London Gateway Port (the former Shellhaven refinery), Sheerness Container Terminal and Dover (Terminal 2). All these developments had actual or potential impacts on submerged landscapes. Exploitation of offshore hydrocarbon resources followed the 1958 UN Continental Shelf Convention, in which the national limits of exclusive economic zones were ratified, permitting national licensing. Prospection and extraction followed, and has continued, though recently on a reduced scale, up to the present. Since the first wave of development preceded the EU Environmental Impact Assessment Directive (EU Directive 97/11/EC: see below), its effects on seabed prehistory cannot be determined now although, as in the case of the fishing industry, there has been a serendipitous bonus; the data obtained by the oil and gas industry during prospection has subsequently, and unexpectedly, proved highly informative in terms of paleo-landscape reconstruction (Gaffney et al. 2007). The so-called Viking Bank flint was also found as a result of the systematic sediment coring carried out in support of the offshore hydrocarbon licensing programme between Shetland and Norway in 1981 (Long et al., 1986). The now-depleted hydrocarbon reservoirs may have a new role to store a strategic reserve of imported natural gas or act as repositories for captured carbon dioxide (see, for example, www.npd.no/en/news/News/2011/November-2011/). This might necessitate new offshore construction works. Currently, the governments of all countries bordering the North Sea envisage large-scale expansion of renewable energy sources, principally wind farms, though potentially also tidal barrages, despite abandonment of plans for the Severn Barrage in the UK. Besides the footprint of oil and gas platforms, wind turbines and barrages, the laying of associated pipelines and cables has the potential to damage or disturb deposits. The offshore aggregates industry has expanded substantially in recent decades: over around 20 million tonnes of marine aggregate are dredged annually, providing 19% of sand and gravel sales in England (www.bmapa.org). Comparable volumes are dredged annually from the Dutch part of the North Sea; note, moreover, that the extension of Rotterdam harbour involved 240 million m^3 of sand. The extraction areas are concentrated, plainly, where there are Pleistocene sands and gravels related to paleo-landscape features, and known to include Paleolithic artefacts and rich faunal assemblages. Extraction can also result in disturbance of Holocene deposits of archaeological significance (Fig. 9.2). To help mitigate this, collaboration between archaeologists and industry, especially the aggregates and offshore renewable energy sectors, has resulted in the development of guidelines and protocols.

The twenty-first century is likely to bring new types of seabed exploitation, related to the development of new offshore technologies and to meet new needs. The idea of building a dam across the mouth of a major embayment of the North Sea named The Wash in eastern England, to create a vast freshwater reservoir capable

Fig. 9.2 Excavations in the Yangtze harbour basin, Rotterdam. A Mesolithic occupation layer at 20 m below the water surface is being sampled by means of a special crane. Samples are packed in large white bags, before being wet-sieved. For the first time, Mesolithic occupation remains were uncovered from a submerged landscape under relatively controlled conditions. (Photo by B. Smit, Rijksdienst voor het Cultureel Erfgoed, courtesy of the Port of Rotterdam)

of supplying over 2,700 million litres per day, was proposed in the 1960s (Morey 1968, p. 273). In view of the chronic water-supply problem for south-east England, and the prospect of increased frequency of summer droughts later in the century (Murphy et al. 2009) it is possible that similar projects might be considered again, despite the environmental consequences. There can be little doubt that the resources of the sea will increasingly be exploited in one way or another, and that new types of development are likely to impact submerged prehistoric land surfaces.

Heritage organisations face formidable challenges in terms of managing the cumulative impacts of a wide range of industrial sectors on submerged prehistoric landscapes, and these will increase. Management must not impede essential economic development, yet at the same time must ensure that economic activity does not result in the loss of significant scientific information. Moreover, since modern maritime jurisdictional boundaries are artificial constructs unrelated to submerged landscapes, international collaboration to ensure consistent approaches to research and management is essential. To explore how these aims can be achieved, we need first to examine the existing legislative and regulatory framework, to which a very brief introduction and interpretation is given in the following section, though this does not purport to provide strict legal opinion or definition.

The International, EU and UK Legislative and Regulatory Framework

The United Nations Convention on the Law of the Sea (UNCLOS 1982) makes very little reference to the historic environment, although Article 303(1) states that 'States have the duty to protect objects of an archaeological and historical nature found at sea and shall cooperate for this purpose'. The general thrust of Article 303 is related to controlling 'traffic in such objects'. The drafters had in mind items that might be of monetary value in the antiquities trade, but such considerations are not especially significant in terms of submerged prehistory, although, in recent years, some prehistoric artefacts, faunal, and even human remains from offshore contexts have been offered for sale on the Internet; contact with the sites involved has resulted in items being withdrawn from sale.

The UNESCO Convention on the Protection of the Underwater Cultural Heritage (CPUCH 2001) includes a preamble referring to 'the need to respond appropriately to the possible negative impact on underwater cultural heritage of legitimate activities that may incidentally affect it'. This preamble sets out a basic principle, which is fleshed out later in the document in a series of Rules in an Annex, including 'Rule 1: The protection of underwater cultural heritage through in situ preservation shall be considered as the first option…' and 'Rule 6: Activities directed at underwater cultural heritage shall be strictly regulated to ensure proper recording of cultural, historical and archaeological information'. Despite not ratifying the Convention, the UK Government has stated that it recognises the Rules of the Annex as representing good practice and all work by English Heritage is aligned thereto (Hansard; HC Deb 2005, 24 January 2005: Column 46W ref 210917. Available from http://www.publications.parliament.uk/pa/cm200405/cmhansrd/vo050124/text/50124w13.htm).

Two EU Directives have had direct application in terms of assessing and mitigating the impacts of industry on submerged prehistory. Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment, is generally known as the 'SEA Directive' (Strategic Environmental Assessment). Its purpose is to ensure that environmental consequences of certain plans and programmes are identified and assessed during their preparation and before their adoption. Plans and programmes subject to SEA in UK include offshore oil and gas and renewable power project licensing. One outcome of this directive was the preparation of a series of reports by (Flemming 2002–2005) for the then UK Department of Trade and Industry that summarised understanding of submerged prehistory in UK seas at that time, and recommended mitigation measures to prevent damage to submerged prehistoric remains arising from oil and gas activities.

The Environmental Impact Assessment (EIA) Directive (EU Directive 97/11/EC, which amends the original Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment), came into effect in July 1988. It has a more specific purpose than the SEA Directive, being concerned with 'projects' rather than 'plans and programmes' (for a report that compares EIA

and SEA see: http://ec.europa.eu/environment/eia/pdf/final_report_0508.pdf). Annex III of the EIA Directive expands on Article 5 to explain that the aspects of the environment likely to be significantly affected by a proposed project includes '… the architectural and archaeological heritage…'. In short, and in the context of submerged prehistoric landscapes, the EIA Directive has required survey and the development of programmes of mitigation, commissioned by developers from archaeological consultants that have generated substantial amounts of new information.

Other European instruments include the Council of Europe Convention for the Protection of the Archaeological Heritage of Europe (revised) (Valletta 1992). This convention reflects the change in the nature of the threats to the archaeological heritage, which now come less from unauthorised excavations, as in the 1960s, and more from the major construction projects carried out all over Europe from 1980 onwards. The revised convention established a body of new basic standards for Europe, to be met by national policies for the protection of archaeological assets as sources of scientific and documentary evidence. It applies to submerged sites and incorporates research, rather than just conservation, dimension (Articles 1.1–1.2) and provides for 'archaeological reserves' (Article 2).[1] The Council of Europe Landscape Convention has the general aims of conserving, managing and planning landscapes, and encouraging public authorities to adopt policies and measures at all levels to achieve this. 'Landscape' covers the parties' entire territories, including coastal waters and the territorial sea. It applies to 'ordinary landscapes' no less than outstanding ones. Policies should be in keeping with the provisions of the convention, and landscape should be accommodated within spatial planning and cultural, environmental, agricultural, social and economic policies. It recognises that landscapes are impacted by processes originating elsewhere, unchecked by national boundaries, and hence, an approach at a European level is necessary. It must be noted, however, that Council of Europe conventions do not carry the same legislative force as EU Directives. Moreover they are applicable only to national territories, i.e. the limit of the territorial sea, out to the 12 nautical mile limit.

In addition to international legislation and conventions, and those arising from larger political units, such as the EU, most nations have internal domestic legis-

[1] At present, apart from wreck sites designated via the UK Protection of Wrecks Act 1973, there is no legislation permitting the establishment of 'archaeological reserves' in UK waters. However, a further EU Directive, (92/43/EEC), also known as the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, or the 'Habitats Directive' for short, might be helpful in some cases. The Habitats Directive provides for the definition of Special Areas of Conservation (SACs) for habitats and species considered to be of European interest following criteria given in the directive. Designation of SACs on natural environment grounds may also, but purely coincidentally, serve to protect areas of archaeological significance. For example, the UK Joint Nature Conservation Council consulted in August 2010 on the selection of UK offshore SACs, including the Dogger Bank, primarily on the grounds of seabed habitat protection. This could lead to regulation of activities on an area which is also significant in terms of paleo-geography: the Dogger Bank formed an elevated area of land in the North Sea in the early post-glacial, becoming an island *c.* 8700BP, and finally being submerged *c.* 7500 BP (Ward, Larcombe and Lillie 2006). The UK Marine and Coastal Access Act 2009 provides for designation of Marine Conservation Zones, which might be similarly helpful, but again coincidentally.

lation relating to their cultural heritage. For example, Germany has a federated 'Lander' structure, and cultural heritage is a Lander-level management responsibility, not a federal one. Such management structures cause further confusion. EU Directives have been transposed to UK legislation by domestic regulations, but there are other UK Acts of Parliament related to the historic environment: the Protection of Wrecks Act 1973; Ancient Monuments and Archaeological Areas Act 1979; Town and Country Planning Act 1990; National Heritage Act 2002; and the Marine and Coastal Access Act 2009[2]. The National Heritage Act 2002 modified English Heritage's functions within the English part of UK territorial sea (out to the 12 nautical mile limit), to include securing the preservation on the seabed, and promoting the public's enjoyment of, and advancing their knowledge of monuments in, on, or under the seabed.

In the Netherlands, the Monuments Act 1988 (revised 2007) provides the legislative basis for managing submerged prehistoric archaeology within the territorial sea. The revised Monuments Act (Wet op de Archeologische Monumentenzorg, WAMz) explicitly includes a regime based on the Valetta Convention, requiring developers to conduct archaeological investigation prior to any disturbance of the subsoil. In principle, the same regulations apply to the on-shore and near-shore heritage, in terms of the responsibilities of authorities, developers and individuals. As most of the Dutch Territorial Sea directly falls under the government's responsibility, the National Heritage Agency (RCE) is the main player in the field. However, the role of commercial companies is increasing in terms of providing advice to developers and regulators and characterising the marine historic environment.

Collaboration with Industry

Increased economic use of marine resources will pose significant challenges for managing impacts on submerged paleo-environments. However, heritage professionals, government and industry have been working together for a number of years to find ways to better manage and mitigate the impacts of development. The Joint Nautical Archaeology Policy Committee (JNAPC) formed in 1988 with the aim of raising awareness of Britain's underwater Cultural Heritage and achieving protection for sites comparable to that on land. In 1995 the JNAPC published their 'Code of Practice for Seabed Developers'. This voluntary code was the first serious attempt to establish best practice for consultation and cooperation between seabed

[2] Although not *directly* concerned with the historic environment, the 2009 Act effects it. In very brief summary, some of the main provisions of this Act saw the establishment of a Marine Management Organisation (MMO) that, by establishing a system of Marine Planning and Licensing, now coordinate the formerly fragmented system of sectoral marine consents. In addition ten Inshore Fisheries and Conservation Authorities (IFCAs) have been established, and a system of Marine Conservation Zones is being developed. The 2009 Act is helping deliver more efficient protection of all marine resources, including an improvement in the way our marine historic environment is protected and managed.

Fig. 9.3 Aggregate industry staff at CEMEX's Leamouth Wharf inspects artefacts during a BMAPA protocol site visit. These sessions provide a vital feedback and training mechanism to the marine aggregate industry staff most likely to come into contact with archaeological material. (Photo copyright of Wessex Archaeology)

developers and marine archaeologists (JNAPC 2006, http://www.jnapc.org.uk/). Revised versions of the code have since been produced.

In 2003, English Heritage and the British Marine Aggregate Producers Association (BMAPA) jointly published the Guidance Note 'Marine Aggregate Dredging and the Historic Environment'. This represented a major advance in establishing archaeological best practice for marine developers by providing practical guidance on assessing, evaluating, mitigating and monitoring the archaeological impacts of marine aggregate dredging in English waters. It sought to provide the industry with greater clarity on dealing with archaeological issues throughout all stages of the marine aggregate development process. It sets out agreed and endorsed measures to mitigate the effect of marine aggregate extraction on the historic environment (BMAPA and EH 2003).

Following on from this, in 2005 BMAPA and English Heritage published the 'Protocol for reporting finds of archaeological interest'. This document aimed to reduce the effects of marine aggregate extraction by enabling people working in the industry to report archaeological finds (BMAPA and EH 2005). This included various mitigation and management options that allow marine aggregate operators and heritage professionals to develop practical procedures for the discovery of significant finds (Dellino-Musgrave, Gupta and Russell 2009). The procedures provide a single, sector-wide protocol applicable to all dredging areas, vessels and wharves, thereby delivering a clear and consistent approach. In order to maintain interest and awareness, feedback is essential, particularly given high employee turnover rates within the industry. A protocol 'awareness' programme ensures that information about finds is regularly disseminated to staff, and a protocol 'implementation' programme ensures that staff members receive regular training (Fig. 9.3). Since 2005, a total of 281 separate reports detailing 888 individual finds have been submitted through the protocol, from remains of World War II aircraft, to prehistoric faunal remains. These finds represent a valuable source of information for understanding the nature, date and distribution of sites within the submerged prehistoric landscape (Flatman and Doeser 2010). One of the most significant finds to date was the discovery of 88 Paleolithic flint implements, including 33 hand axes, on the discarded pile of a Dutch wharf by a private collector in 2007–2008 (Fig. 9.4). These artefacts

Fig. 9.4 A selection of the 33 Middle Paleolithic hand axes recovered from marine aggregate licence Area 240 in 2007/2008. The site of their discovery was excluded from further extraction and a subsequent programme of research and investigation of the area and the wider palaeo-environmental context has been undertaken. (Photo courtesy of Peter Murphy, English Heritage)

had been removed from a cargo taken from English aggregate licence Area 240, located some 11 km off the Norfolk coast. Following the reporting of finds to EH by the RCE, best practice was followed in accordance with the provisions of the protocol and the operators promptly instigated an exclusion zone around the dredge lanes from which the cargo had been taken. Subsequent investigations of this site by Wessex Archaeology were funded by English Heritage through the Aggregates Levy Sustainability Fund (ALSF). This multiphased assessment allowed for the first time, an in-depth investigation of a discrete area demonstrated to contain Paleolithic artefactual material. The project included the use of a full suite of investigative techniques including:

- Review of industry geophysical and geotechnical data
- Collection and analysis of new geophysical data (Side Scan Sonar, Multi Beam Echo Sounder, Boomer, Chirp, and Parametric sonar)
- Grab sampling and video survey
- Vibrocore survey
- Scientific dating and paleo-ecological analysis (Fig. 9.5).

The results of this project made a significant contribution to our knowledge of the paleo-environmental history of this area, and further work to investigate the archaeological potential of the wider dredging region, supported by the industry, is now underway.

The development of a number of these initiatives owes much to the advent of the Aggregates Levy Sustainability Fund (ALSF). Introduced in April 2002, the ALSF was a tax on aggregates won from both land and marine sources, a percentage of which is set aside to help address environmental impacts. The ALSF allowed heritage professionals to secure funds for a wide range of projects aimed at reducing or mitigating the impacts of aggregate extraction on the historic environment. English Heritage was a major distributor of the fund on behalf of the Department for Environment, Food and Rural Affairs (Defra) and also assisted in the administration

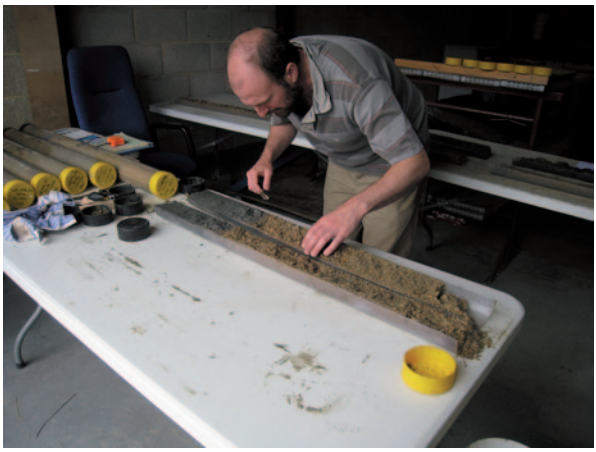

Fig. 9.5 A geo-archaeologist at Wessex Archaeology examines a parted core from marine aggregate licence Area 240 as part of the work funded via the Aggregate Levy Sustainability Fund. (Photo courtesy of Peter Murphy, English Heritage)

and distribution of a ring-fenced marine fund (MALSF) allocated to interdisciplinary projects (http://www.cefas.defra.gov.uk/alsf.aspx). Between 2002 and 2008 the ALSF funded over 250 projects involving the historic environment to a total value of £ 23.1m and between 2008 and 2011 English Heritage distributed an additional £ 4.5m, £ 1.5m of which was allocated to marine projects (Flatman and Doeser 2010). Unfortunately, the UK Government decided to discontinue the fund as of the end of March 2011.

A number of ALSF projects focused on enhancing baseline historic environment information through survey and mapping projects. The Regional Environmental Characterisations were an interdisciplinary project funded through the MALSF which aimed to acquire high-quality marine data to enhance marine mapping and broad scale characterisation of seabed habitats, biological communities and historic environment features. The South Coast REC project report was published in early 2010 and highlighted a number of areas with high potential for the survival of submerged prehistoric archaeological material (see BGS 2010). The University of Birmingham's '3D seismics as a source for mitigation mapping of the Late Pleistocene and Holocene depositional systems of the southern North Sea' pioneered GIS analysis of 3-D seismic data to identify a number of paleo-landscape structures beneath the present seabed. Further ground truthing and field validation, as part of the REC studies, established the age of some geo-morphological structures identified, and the results indicate the importance of the Dogger Bank for research on submerged prehistoric landscapes (Peeters et al. 2009). Meanwhile, Wessex Archaeology's 'Seabed Prehistory' project sought to establish best practice for the assessment and evaluation of prehistoric deposits on or beneath the seabed in the course of the marine aggregate development process (Wessex Archaeology 2008). This project also highlighted the significant contribution ALSF projects have made to our knowledge of investigative techniques and methodologies, as seen in the recent research work in Area 240. In addition several ALSF projects have delivered crucial outreach and dissemination programmes which contribute to greater understanding and awareness of the marine historic environment (see HWTMA 2008).

The examples above demonstrate how research funded through ALSF enabled better management of submerged prehistoric landscapes delivering benefits for industry and archaeologists alike. There have been significant advances in our knowledge of what remains an inaccessible and relatively poorly understood area of our heritage, allowing heritage bodies to give more informed management advice. Initiating dialogue between the two parties at an early stage of the planning process has ensured that heritage factors can be considered from the initial stages of a development project though to its completion. Such an approach has led to reduced risk and uncertainty for developers associated with unexpected finds and time delays, or the need to amend project designs. Finds reported through the protocol are now starting to deliver considerable added value as information sources for the resource assessment phases of research agendas such as the ALSF funded 'Maritime Research Framework'. This framework provides an overview of current knowledge and sets out an agreed research agenda to enable long-term strategic planning, and inform policy, funding and future projects (University of Southampton 2008 and University of Southampton 2013). The aforementioned 'Protocol' finds will similarly be an important source of information for the production of the UK Government's Marine Plans that are currently in development. The framework for preparing these plans was set out in the UK Government and devolved nations publication 'Our Seas—a shared resource: High Level Marine Objectives'. This document set the basis for the Marine Policy Statement and included important consideration of the need to incorporate cultural heritage as a component of delivering sustainable development within the marine environment. The UK Marine Policy Statement retains these core principles and clearly identifies that decision-making should take account of designated cultural heritage sites or of sites with identified significance. Importantly this document adopted a broad definition of 'the historic environment' which encompasses submerged landscapes. As such the new marine planning system will contribute to the effective management of marine activities and more sustainable use of marine resources, creating the framework for consistent and evidence-based decision-making.

Significant partnerships have been established with other marine industries, in particular the offshore renewable sector. COWRIE, or Collaborative Offshore Windfarm Research into the Environment, was a registered charity that was set up to advance and improve understanding and knowledge of the potential environmental impacts of offshore wind farm development in UK waters. Several guidance notes were commissioned by COWRIE which aim to establish best practice in managing and mitigating impacts on the historic environment. 'Historic Environment Guidance for the Offshore Renewable Energy Sector' provides generic guidance on the survey, appraisal and monitoring of the historic environment during the development of offshore renewable energy projects in the UK (COWRIE 2007). An Offshore Renewables Archaeological Reporting Protocol, similar to the aggregates protocol, has also been developed and is now used by the industry. It was produced in response to the Round Three offshore wind zone development projects. In total, these areas cover almost 27,000 km² of seabed out to the UK Continental Shelf, with the largest zone on the Dogger Bank (8660 km^2) being equivalent in size to

North Yorkshire, although it should be noted that only a fraction of these areas will be subject to final development (The Crown Estate 2012). In 2008 COWRIE published 'Guidance for the Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy'. This document sought to provide guidance on the historic environment content of Cumulative Impact Assessments, a legal requirement of any Strategic Environmental Assessment (SEA) or Environmental Impact Assessment (EIA) (COWRIE 2008). COWRIE has also published guidance on the Archaeological Assessment of Geotechnical data entitled 'Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector'. This guidance will play a key role in the future as heritage professionals seek to ground truth archaeological interpretations of geophysical data to gauge the true significance of paleo-landscape structures.

International Approaches to the Research, Management and Conservation of Submerged Prehistory

While the discussion above outlines approaches to the management of submerged prehistory in UK and Dutch waters, the submerged landscapes beneath our seas do not respect such modern territorial boundaries. During the Last Glacial Maximum (c. 22,000-20,000BP) sea levels were as much as 130 m below present levels, adding c. 40% to the present landmass of the European continental shelf alone (COST 2008). These landscapes now occupy large areas of seabed where a number of modern nations may claim territory or mineral rights under the United Nations Convention on the Law of the Sea (UNCLOS, see above). Transnational approaches to management of this unique area of our heritage must be developed. In order to do this we must first gain an understanding of current approaches to the research and management of submerged prehistory outside the UK. What work is currently being undertaken, what types of organisations are involved, what regulatory frameworks (if any) do they operate under, and most importantly what lessons can we learn?

Europe

Project Deukalion was conceived in 2008 by Dimitris Sakellariou and Nic Flemming as a multinational collaborative research programme. A Deukalion Planning Group was set up in July 2008 at the World Underwater Archaeology Conference (IKUWA3) with 16 experts from 8 European countries to convene regular meetings and draft the outlines of a multi-stranded project that might attract funding as a Large Integrated Project under the European Commissions' Framework Programme Seven (FP7), the financial programme by which the European Union supports research and development activities (http://cordis.europa.eu/fp7). The main goals of Deukalion were to:

1. Map the 40% of the European continental shelf that has been drowned by the 130 m rise of sea level since the end of the Ice Age
2. Exploit and integrate new technologies and data developed in Europe to conduct seabed archaeology, and
3. Raise public awareness of submerged cultural heritage, add efficiency to offshore development and improve understanding of long-term sea level and climate change

The concept of Project Deukalion is the first of its kind in the world, representing an innovative, multidisciplinary, and multinational initiative with specific aims to:

1. Investigate systematically the prehistoric archaeology and terrestrial landscapes now submerged on the European continental shelf
2. Integrate the skills of archaeological institutions and oceanographic agencies and use modern offshore, laboratory and computing technology
3. Recover valuable but threatened archives of data on the deep cultural and environmental history of Europe
4. Illuminate long-term social response to sea level and climate change

In 2009, the Deukalion Planning Group took advantage of a call under the COST (European Cooperation in Science and Technology; http://www.cost.eu**)** scheme of the European Commission (Flemming et al 2010). COST is an intergovernmental initiative, and does not fund new research projects, but rather provides funds for meetings to coordinate national research, and for dissemination and training. An application submitted by Geoff Bailey on behalf of the group was successfully initiated in November 2009 for a 4-year period as COST Action TD0902 SPLASHCOS, 'Submerged Prehistoric Archaeology and Landscapes of the Continental Shelf'.

The aims of SPLASHCOS are to promote research on the archaeology, climate and environment of the submerged landscapes of the continental shelf, and more specifically to 'improve knowledge on the location, preservation conditions, investigation methods, interpretation and management of underwater archaeological, geological and paleo-environmental evidence of prehistoric human activity, create a structure for the development of new interdisciplinary and international research collaboration, and provide guidance for archaeologists, heritage professionals, scientists, government agencies, commercial organisations, policy makers and a wider public'. The original aspirations of the Deukalion Project remain in place and are incorporated within the SPLASHCOS initiative, and the Deukalion Planning Group continues to meet within the framework of the SPLASHCOS Action to consider long-term strategic plans and research opportunities.

This action has been developed in response to significant increases in the numbers of countries and institutions undertaking research into submerged prehistory. It has also come at a time of increasing threats from industry and other marine activities. The SPLASHCOS Action has now grown to include over 100 archaeologists, marine geophysicists, environmental scientists and heritage professionals drawn from over 60 institutions in 26 European countries, together with a wider corresponding network of individuals. At the time of writing, it is entering its final year, with two public conferences planned. A number of training opportunities

have been offered for early-stage researchers. Web-based directories of information and 5 multi-authored publications are currently planned or in progress, and the SPLASHCOS initiative has directly stimulated a number of new research projects funded at national, bi-national or European level, dealing with particular areas of the European shelf, or specific problems such as the development of new technologies tailored to the needs of the underwater heritage.

North Atlantic

SLAN, or the 'Submerged Landscapes Archaeological Network' is a group of researchers from universities and government agencies in Ireland and Newfoundland who use marine geophysical tools and techniques to develop understanding of submerged archaeological landscapes across the North Atlantic (http://www.science.ulster.ac.uk/cma/slan/). Since its formation in 2006 SLAN has undertaken a number of research-led projects including:

- Archaeological assessment of data collected under The Joint Irish Bathymetry Survey (JIBS)—a partnership project undertaken by the UK Maritime and Coastguard Agency (MCA) and the Marine Institute (MI) (www.marine.ie). A number of Paleolandscape features were identified and recorded. Funding was provided by the Irish National Strategic Archaeological Research Programme (SLAN 2008/b).
- A project to map submerged landscapes off north-east Newfoundland. In 2007 an integrated coastal landscape and seabed archaeological survey was undertaken in Back Harbour in Newfoundland. During a 2008 survey numerous coastal features associated with lower sea level positions were tentatively identified during analysis of acoustic profiles (SLAN 2008/b).
- SLAN also received funding for a round table to build Government and Industry Partnerships in Seabed mapping across the N. Atlantic. Funding was provided through two grants from Memorial University, Newfoundland, and a grant from the Ireland Business Partnerships in the Department of Innovation, Trade and Rural Development, Government of Newfoundland and Labrador (SLAN 2008/a).
- More recently SLAN has conducted a number of field surveys to ground truth the paleo-landscape features recorded through The JIBS (see http://submerged-landscapes.wordpress.com/ for further details).

North America

In North America the Bureau of Ocean Energy Management (BOEM, formerly the Minerals Management Service) is the federal agency responsible for managing marine and energy development on the US Outer Continental Shelf (OCS)

(www.boem.gov). Federal law requires that BOEM considers the effects of any marine development upon archaeological resources present within the area of potential effect. In discharging its responsibilities BOEM must ensure that any marine development meets the requirements of the National Historic Preservation Act (NHPA) of 1966 (as amended), the National Environmental Policy Act (NEPA) of 1969 and the Outer Continental Shelf Lands Act (OCSLA) of 1978. To enable this, BOEM funds research in the marine historic environment through their Environmental Studies Programme; this ensures that the most up-to-date scientific information is available to support their management decisions (www.boem.gov). 'Examining and Testing Potential Prehistoric Archaeological Features on the Gulf of Mexico, Offshore Continental Shelf' (GM-92-42-136) is one such project funded by BOEM in collaboration with the Coastal Marine Institute at Louisiana State University. This project has collected a number of cores on the Gulf of Mexico OCS, and these cores are being used to ground truth potential prehistoric sites and features previously identified through interpretation of remote sensing data. The results of this project will enhance the baseline information for prehistoric sites in the OCS, and improve survey methodologies and archaeological interpretations of geophysical data (www.boem.gov/OEP/). It is the results of projects such as this that are also used by BOEM to update guidance provided to marine developers called 'Notices to Lessees and Operators'. These documents include guidance on survey requirements for marine heritage sites, features and landscapes and detail of relevant regulations (see Flatman and Doeser 2010).

The National Oceanic and Atmospheric Administration is another US federal organisation that funds research in the marine environment through the Office of Ocean Exploration and Research. A number of NOAA-funded projects have sought to identify evidence of early human occupation of the North American continent. In 2007 the Institute of Maritime History and the University of New Hampshire received a grant from NOAA to undertake a 2-year submerged landscape survey in Blue Hill Bay, Maine. This project was initiated after the discovery of prehistoric artefacts in the Gulf of Maine by local fishermen (Fig. 9.6). The survey tested the effectiveness of a variety of survey techniques and methodologies, and a number of relict submerged landforms were identified (www.maritimehistory.org). In 2008 a research group from Mercyhurst College, Erie, Pennsylvania also gained funding from NOAA for a project to identify and map a number of submerged prehistoric river channels on the continental shelf of the Gulf of Mexico off Florida's coast. The research potential of this area was identified after a number of finds washed up on the Gulf coast or were retrieved during dredging. Subsequent work in 2009 sought to gather further evidence of these submerged river systems using side scan sonar and sub-bottom profiling techniques (Mercyhurst College 2009). In addition to funding from NOAA support was provided by a range of multidisciplinary institutions including; universities, archaeological research institutions and geological surveys (http://mai.mercyhurst.edu/research/anthropologyarchaeology-research/noaa-exploration/).

Fig. 9.6 A prehistoric stone biface estimated to be c. 9,000 years old, part of an assemblage of prehistoric artefacts found by scallop fishermen in the Gulf of Maine in the 1990's. A two-year submerged landscape survey in Blue Hill Bay, Maine was subsequently undertaken by the Institute of Maritime History and the University of New Hampshire with funding from NOAA. (Photo copyright of Stefan Claesson, 2007)

The Practicalities of International Collaboration

What happens in practice when the heritage agencies of adjacent nations begin collaborating over the submerged prehistoric landscapes beneath their seas? The following account might prove instructive, as a 'lessons learned' exercise. It illustrates the very marked 'cultural' differences that can exist between neighbouring countries, the ways in which the availability of funding sources can influence the direction of research and highlights potential difficulties that might be experienced in the future.

English Heritage originated as an organisation focused on the terrestrial dryland historic environment. Although it and its predecessor the HBMCE funded coastal surveys and excavations as far back as the1980s (see Fulford et al. 1997; Wilkinson and Murphy 1995), coastal and maritime archaeology was only one amongst many of its concerns. Wetland areas, now drained but formerly submerged at times, were also investigated and their prehistoric archaeology related to Holocene stratigraphy and paleo-ecology, as part of a wider EH wetlands programme in the 1980s and later (e.g. Waller 1994). The developing perception of submerged prehistoric landscapes in the North Sea by academic prehistorians, initiated by Coles (1998), was certainly understood and appreciated by some people within the organisation, but in the absence of either techniques or funding which might advance their investigation, this seemed of no practical application at that time. The publication of the influential paper 'Taking to the Water' (Roberts and Trow 2002), and the establishment of a Maritime Archaeology Team (MAT) in the same year initiated a new direction.

The development of prehistoric studies in the Netherlands was influenced by the geology and geography of the country, being focused around the major estuaries of the Scheldt, Meuse, Rhine, IJssel and Ems, where prehistoric and later sites are stratified within deep Holocene sediment sequences. From 1920 onwards, following the establishment of the Biologisch-Archaeologisch Instituut (BAI) under the direction of A.E. van Giffen at the University of Groningen, integration of prehistoric and natural scientific studies, especially at wetland sites, was seen as essential

(Waterbolk 1981). As Waterbolk notes, a 'concern with the relation of early man to his aquatic environment' and 'close association with Holocene geology…appear to be the main characteristic feature[s] of Dutch archaeology'. Jelgersma's (1961) pioneering sea-level curve, based on radiocarbon-dated peats, was one outcome, unsurprisingly in a country where sea level is a key concern. The strong link between archaeology and the environmental and biological sciences was maintained in the establishment of the National Service for Archaeological Investigations, (ROB), now National Heritage Service (RCE). Nevertheless, as in the UK, most interest focused on the onshore heritage, especially the wetland environments of the western Netherlands and there was initially little active interest in submerged prehistory. This appears to have resulted from the assumption that it would be impossible to investigate or preserve offshore prehistoric remains, if not a misconception that sites underwater would have been destroyed. This perspective has only recently begun to change (Maarleveld and Peeters 2004; Peeters et al. 2009; Peeters. 2011). In both countries, university departments have been involved in research related to submerged prehistory, but in the Netherlands the museums sector—for which there is strong regional tradition—has taken a much more prominent role than in the UK, notably in terms of establishing working relationships with fishermen to ensure recording of artefacts and faunal remains immediately after their recovery by trawling (Glimmerveen et al. 2004). Several of the contributors to the North Sea Prehistory Research and Management Framework 2009 were based at the Rotterdam Natural History Museum, but no British museums were represented at all. Both countries also have a tradition of amateur involvement, through the activities of individual collectors, the Council for British Archaeology and the Dutch Werkgroep Pleistocene Zoogdieren and this has on occasions produced significant results: for example, the finding of hand axes dredged from Area 240 at a Dutch aggregate wharf by the amateur palaeontologist Jan Meulmeester (Holden 2008) and the prehistoric artefact collection from the Solent, UK assembled by the fisherman Michael White (Wessex Archaeology 2004). On the whole, however, the Dutch tradition of amateur involvement was stronger.

Besides the differing traditions of the two countries, one key UK initiative, begun in 2002, has been the development of the Aggregates Levy Sustainability Fund (ALSF: see above). This has resulted in numerous maritime archaeological studies spanning almost a decade, many related to submerged prehistory, and some of which have been referred to above. Although collections of prehistoric artefacts from marine contexts have certainly not been neglected, it seems fair to say that the objectives of the ALSF have encouraged strategic and contextual investigations, often based primarily on geophysics, such as those mentioned in the introductory paragraph of this chapter. By contrast, in the Netherlands, where no comparable fund existed, most research could fairly be summarised as artefact and ecofact-based, often focusing on material recovered by the fishing industry (e.g. Glimmerveen et al. 2004; van Kolfschoten and van Essen 2004). However, in recent years growing awareness about the significance of submerged prehistory amongst heritage professionals in the Netherlands has led to funding of research projects consistent with legislative requirements. In contrast to ALSF-funded projects, the

research in the Netherlands so far has been directly related to specific offshore developments, but there is a strong emphasis on strategic and contextual investigations (Peeters, in press), as in the UK.

The first serious attempt at coordinating prehistoric research on the north-west European shelf followed the production of Nic Flemming's SEA reports (Flemming 2002–2005), and culminated in a workshop, instigated and funded by EH and attended by archaeologists from Norway, Denmark, Germany, the Netherlands and the UK in London in 2003 (Flemming 2004). The volume arising presented a 'state of the art' account of recent research and made recommendations for future research and management, but there was no subsequent advance in implementing these proposals. In October 2006, in an attempt to take things further, two meetings were held at Amersfoort and Rotterdam, involving a small group from the UK and Netherlands. One outcome was the initiation of an electronic newsletter on North Sea Prehistory in early 2007. This was well-received initially but eventually the supply of 'copy' diminished to the extent that the newsletter had to be discontinued after its third issue.

Another venture followed another international workshop at the RCE, Amersfoort in March 2008 that led, eventually, to the publication of the North Sea Prehistory Research and Management Framework (NSPRMF) 2009 (Peeters et al. 2009). The existence of this document marks a degree of progress, but it remains to be seen how influential and useful it will be in the longer term. After all, such a framework is little more than a vehicle to draw attention to the importance of the subject. Critically, its success depends on the actions that follow. The NSPRMF is still 'young' and maybe it is somewhat optimistic to expect major advances at short notice. For the Netherlands, however, the NSPRMF serves as the key document in developing initiatives for heritage management, as in the case of the extension of Rotterdam harbour (Peeters in press), as well as for academic research (Fig. 9.7). Larger-scale research projects are currently in preparation.

Despite obvious advances, there has been a history of initiatives that began positively and optimistically, and certainly achieved some useful outcomes, but eventually proved difficult to sustain. There were several reasons for this. First, these initiatives often depended on impetus and motivation from a few individuals. This made coordination and driving the process highly vulnerable to any changes related to those people. Moreover, no one had the authority to direct overseas colleagues towards achieving desired ends, as would be the case with internally generated nationally based projects. There are several obvious messages to be learned here. First, for historical, 'cultural', organisational and resource reasons, heritage agencies and researchers based in universities and museums in different countries start from divergent positions. This need not present intrinsic difficulties, but it is essential that all parties in future ventures should attempt to understand where their colleagues in other countries are coming from, especially where collaboration between researchers and agencies widely separated by geography are involved. To avoid unrealistic expectations of what can be delivered, some mutual appreciation of 'cultural' backgrounds and funding limitations, at the very least, is needed. As demonstrated earlier in this chapter, it is far too simplistic to assume that the national

Fig. 9.7 Sample residues from the Yangtze harbour excavation are being inspected for the presence of archeological remains. Amongst the finds are charred and uncharred bone, flint, and charred plant remains and charcoal. The materials belong to a phase of occupation that can be dated to the Early Mesolithic. (Photo by D. Schiltmans, Bureau Oudheidkundig Onderzoek Rotterdam, courtesy of the Port of Rotterdam)

heritage agency of another country will be more-or-less like one's own. Secondly, it seems likely that in many organisations there will prove to be rather few people with specific interests in submerged prehistory. In the case of the North Sea initiative, this left the process (which was always under-resourced) vulnerable to changes of personnel. Consequently, a formally constituted organising Secretariat is needed to ensure continuity.

Finally, a reliable source of funding is required. The ending of UK ALSF funding from the end of March 2011 has been noted above. Offshore investigations will continue in north-west Europe, relying principally on the developer funding required by EIA. However it is instructive to read the contractor's comment regarding the work undertaken as part of the ALSF-funded study of North Sea Aggregate Extraction Area 240, discussed above: 'This project has afforded the time and development such that a much more detailed interpretation of Area 240 has been accomplished in comparison to the interpretation typically conducted during the course of an Environmental Impact Assessment (EIA) for an aggregate assessment' (Wessex Archaeology 2011). At a time of economic stringency, it is unlikely that anything comparable to the ALSF could be developed now. International collaboration will be dependent on securing funding from whatever sources are available.

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