

2010-2011



ENGLISH HERITAGE

Protocol for reporting finds of archaeological interest

Annual Report to BMAPA 2010-2011



November 2011

Prepared by

Wessex Archaeology 

British Marine Aggregate Producers Association,
The Crown Estate and
English Heritage

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Project Background

Every Licence Area is studied intensively prior to the granting of a licence to dredge, in order to protect our submerged heritage. Despite this, it was recognised that artefacts are still likely to be present in dredged loads. In August 2005 Wessex Archaeology (WA) drafted the Protocol, on behalf of English Heritage (EH) and the British Marine Aggregate Producers Association (BMAPA), to protect these finds and the sites of archaeological importance that they may signify. In 2009 The Crown Estate (TCE) joined BMAPA as a funding partner, recognising the Protocol's role as an efficient and effective mitigation option to preserve our heritage.

BMAPA member companies have committed voluntarily to implement the Protocol across all existing operations, encompassing wharves, vessels and production licence areas. Under the Protocol, finds recognised within dredged loads, at wharves or on the seabed are reported to a Site Champion and then to a designated Nominated Contact who reports them to the curator. To expedite this process a Protocol Implementation Service run by WA was set up. WA is alerted to each new find through the dedicated reporting website of the Protocol Implementation Service.

The Protocol covers the full range of possible artefacts. Some munitions may be of archaeological interest, such as cannonballs, the majority of which are inert and

therefore safe to report. However, the reporting of munitions is subordinate to the appropriate health and safety concerns, as detailed in the BMAPA Guidance Note 'Dealing with Munitions in Marine Aggregates'. Artefacts relating to military aircraft are reported frequently and these are considered with regard to an Annex to the Protocol published in February 2008 (both are available online or from WA).

WA is currently conducting some aspects of EH's role through the Protocol Implementation Service, although only where a find is deemed to be non-contentious and is unlikely to result in the creation of an exclusion zone. Finds that require a higher level of curatorial involvement are referred to EH in the first instance. Details of all dredged finds are reported to: EH; BMAPA; TCE; the National Record for the Historic Environment (NRHE - previously the National Monuments Record); the appropriate local Sites and Monuments Record (SMR); Historic Environment Record (HER) and the Finds Liaison Officer for the Portable Antiquities Scheme (PAS). All finds are also published on WA's website and the good work done by BMAPA companies with regard to the Protocol is made accessible through various dissemination programmes, conducted both by WA and by other organisations.

The Implementation Service has now completed its sixth year of operation and this annual report covers the period from 1st October 2010 to 30th September 2011.

BMAPA Company	Nominated Contact	Position
Britannia Aggregates Ltd	Richard Fifield	Marine Resources Manager
Brett Aggregates	Richard Fifield	Marine Resources Manager
DEME Building Materials Ltd	Frank Devriese	General Manager
Hanson Aggregates Marine Ltd	Nigel Griffiths	Principal Resources Manager
Kendall Bros (Portsmouth) Ltd	Richard Kendall	Managing Director
Northwood (Fareham) Ltd	Tom Hills	Operations Manager
Lafarge Aggregates Ltd	Malcolm Whittle	Marine Aggregates General Manager
Norwest Sand & Ballast Ltd	Nick Brown	Site Supervisor
CEMEX UK Marine	Graham Singleton and Rebecca Westlake (née Cook)	Resource and Systems Manager and Licence Manager
Tarmac Marine Dredging Ltd	Andrew Bellamy and Simon Lockett	Resources Manager and Resources Co-ordinator
Volker Dredging Ltd	Will Drake	Marine Resources Manager

Six Years of the Protocol

The past six years of the Protocol have demonstrated the success of this type of scheme as a mitigatory option.

A total of 245 separate reports have been filed since October 2005 detailing over 830 individual finds. These range in date from the Palaeolithic to the 20th century, with some fossil discoveries that pre-date the Palaeolithic. The material discovered is varied, including peat, flint and prehistoric animal bones, maritime artefacts, material derived from aircraft and domestic debris. Some of these artefacts represent chance finds which, were it not for the work of BMAPA companies, may not have been recovered. Others may be indicative of significant sites of archaeological interest worthy of further archaeological investigation.

Finds of flint tools and faunal remains discovered amongst material from Area 240 in 2008 led to an in-depth study into this area of the East Coast dredging region. Case Study 1 explores how Protocol finds such as these have shed light on our submerged prehistory.

Over the past six years the range and variety of material discovered by BMAPA staff has developed into an archive of information about the marine historic environment. This archive is informing archaeological research and the planning of commercial development in specific regions, now and in the future. Details of all finds reported through the Protocol are uploaded to the NRHE and can be found in the reports for the previous five years which are available on WA's website.

WA consults with finds experts, both in-house and from external companies and organisations, to ensure that discoveries are identified accurately and the historical value of each object found is recognised. A full list of specialists consulted this year can be found on page 10.

As a mitigatory option the Protocol has proven to be a successful procedure and this has been recognised by other marine industries. In 2010 TCE launched a Protocol for offshore renewables and possibilities for other industries are currently being investigated (see Case Study 2). The combined protocols will lead to a better overall understanding of the heritage in British coastal waters and will help to protect evidence of our past during commercial work at sea.

The model established by the Marine Aggregates Protocol over the past six years has demonstrated that such protocols are effective, following appropriate environmental impact assessment, in acting as a safety net to protect our marine heritage, discharging licensing conditions and demonstrating best practice by all parties involved.

The Protocol was initially introduced as a voluntary measure by BMAPA member companies across all their operations. As the environmental consents for dredging areas are being renewed over time, the requirement to adhere to the Protocol is increasingly becoming a formal condition of any new Marine Licence granted which permits dredging to continue. However, the requirements of the Protocol and the expectations that it places on operators remain largely unchanged, which demonstrates the effectiveness and robustness of the measures defined by the Protocol when it was originally introduced.

As the Protocol enters its seventh year we are confident that it will continue to add benefit to both public and professional audiences, and industry staff are highly commended for their dedication and enthusiasm, which is evident from the high level of reporting.

Further information about the Protocol and the Implementation Service can be found at:

<http://www.wessexarch.co.uk/projects/marine/bmapa/index.html>

Or by internet searching 'BMAPA Protocol'.



Raising awareness

Raising Awareness

WA operates an Awareness Programme to ensure that industry staff are aware of all aspects of the Protocol and to encourage its use. This has previously received three phases of funding from EH through the Aggregate Levy Sustainability Fund (ALSF). The fourth phase of funding for 2011-2012 has been provided via a joint partnership between BMAPA, TCE and EH.

The 2011 - 2012 Programme consists of:

- Visits to wharves receiving aggregate from BMAPA companies;
- Visits to geophysical and environmental survey companies that service the industry;
- Three new issues of the 'Dredged Up' newsletter in continuation from the programme's previous nine issues. The aim of this bi-annual publication is to publicise the service and highlight recent finds. The tenth issue is due to be published in Spring 2012.

Visits to Wharves and Vessels

Visits to wharves and vessels were deemed crucial, to provide staff with the knowledge and confidence to recognise and report archaeological material amongst dredged loads. The majority of staff at wharves are well informed about the Protocol and reporting procedures. In this new phase of funding, visits will provide Awareness training to new staff, particularly new Site Champions, and refresher training for existing staff. Since April 2011 WA staff have undertaken five visits to wharves, with further visits planned over the next year.

As outlined in detail in the 2008-2009 Protocol Report, the visits utilise a combination of formal and informal techniques, including presentations, artefact handling sessions, group discussions and one-to-one discussion, as appropriate to the circumstances and facilities. Priority for visits is given to wharves that have not received an Awareness visit recently, as it is understood that WA may need to reinforce the messages from previous visits and

provide further information and guidance, especially as new staff may have joined the company since previous visits. These visits have proved successful, often highlighting or clarifying any issues marine aggregate industry staff have experienced with the Protocol, leading to direct improvements in the programme, such as revised guidance.

Visits to ships have proved difficult logistically to organise but in 2009 all vessels were sent an Awareness pack to keep them informed of what to look out for.

Many continental wharves receive aggregate from British waters. In 2010 EH provided additional funding to extend the Awareness Programme to continental Europe, building on work carried out at the inception of the Protocol. The aim of this round of visits was to ensure that the wharves are aware of the Protocol and their responsibilities to report artefacts found in British waters.

This involved a week-long trip visiting seven wharves in Holland and Belgium, and the translation of the Awareness pack into Dutch and French for distribution to wharves and ships. It is important for this successful contact to be maintained, to encourage continental counterparts to report finds. While the Awareness Programme continues WA will email digital copies of 'Dredged Up' to continental contacts as a way to maintain a line of communication and would recommend that further phases of Awareness Programme funding continue to target continental wharves.

Visits to the wharves continue to highlight how vital the Awareness Programme is to the successful operation of the Protocol.

If you would like to arrange an Awareness visit, or would like to receive more advice on finds and finds reporting, please contact WA via protocol@wessexarch.co.uk. You can also view the Awareness information pack, in English, Dutch and French, online at <http://www.wessexarch.co.uk/projects/marine/bmapa/docs.html>

Newsletter

The 'Dredged Up' newsletter informs wharf and vessel staff of finds made and also gives staff an opportunity to see their own finds publicised. Since the 2009-2010 Protocol report, two further issues of Dredged Up have been published, the first in April 2011 and the second in September 2011.

The newsletter is an excellent opportunity to recognise the work of marine aggregate industry staff in ensuring the success of the Protocol. For example, 'Dredged Up 8' announced the winners of the 2009-2010 Finds Awards, acknowledging:

- Best Attitude by a Wharf - Tarmac Erith wharf
- Best Attitude by a Vessel - *Sand Fulmar*
- Best Find - Tarmac Ridham wharf for their discovery of silver tableware

The enthusiastic response to 'Dredged Up' and the Protocol report shows that this material is read and enjoyed, playing an important part in the operation of the Protocol. It is also a useful way to inform industry staff of updates to the Protocol and Awareness Programme and about Protocol-related projects. Winners of the awards for 2010-2011 will be announced in 'Dredged Up 10' in Spring 2012.

The newsletter continues to be a useful tool for publicising the Protocol and the importance of the finds reported through the Implementation Service, beyond those working in the marine aggregates industry. Copies are distributed by EH to a variety of other organisations, to individuals and to the general public.



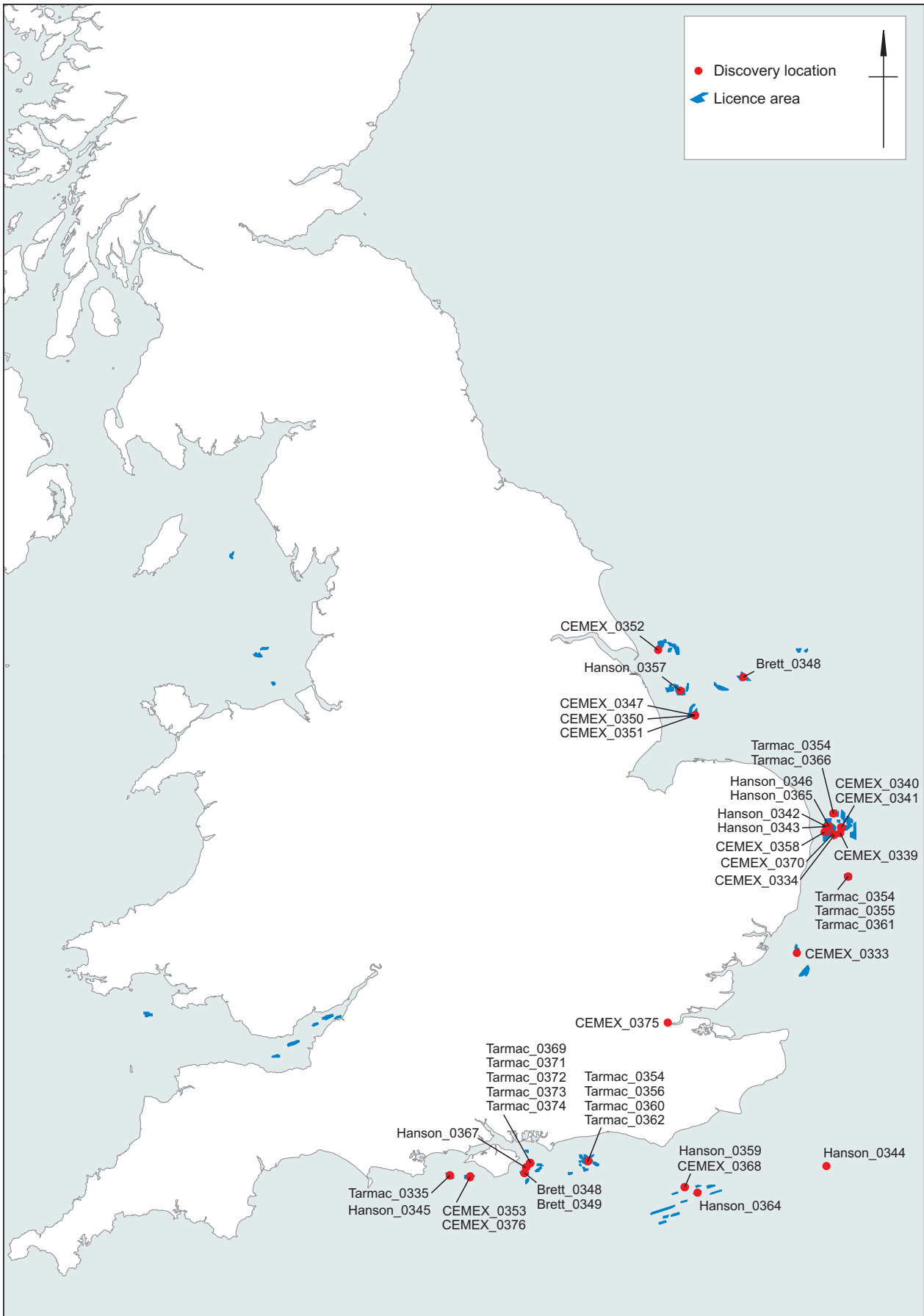
Tarmac Erith wharf



The Sand Fulmar



Silver tableware discovered by Tarmac Ridham wharf



Location of discoveries 2010 - 2011

Reports: Protocol

During the sixth year of operation WA received 40 reports through the Implementation Service. These reports encompassed 49 separate finds (see table below). Further details of each discovery are included in the wharf reports appended to this report.

In addition, eight reports made at the end of the last reporting year were investigated and closed this year. The wharf reports for these are also included in this report.

Finds reports from 2009-2010 completed in the 2010-2011 reporting year

Report ID	Licence Area	Region	Wharf / Vessel	Description	No
Britannia_0305	461	East English Channel	Brett Aggregates, Cliffe	Cannonball	1
Britannia_0306	461	East English Channel	Brett Aggregates, Cliffe	Cannonball	1
Tarmac_0310	127/395	South Coast	Bedhampton	Spoon, copper plate, copper ring	3
Tarmac_0312	127	South Coast	Erith	Cannonball	1
Tarmac_0314	127	South Coast	Erith	Cannonball	1
Tarmac_0324	254	East Coast	City of Westminster	Wrought iron ship fitting	1
CEMEX_0330	447	Thames	Angerstein	Riveted metal	1
Tarmac_0332	447/296	Thames/East Coast	Erith	Mammoth tooth, wood	2

Finds reports from the 2010-2011 reporting year

Report ID	Licence Area	Region	Wharf / Vessel	Description	No
CEMEX_0333	447	Thames	Angerstein	Pair of horseshoes	2
CEMEX_0334	251	East Coast	Sand Falcon	Timber	1
Tarmac_0335	127	South Coast	Bedhampton	1797 Cartwheel penny	1
CEMEX_0339	Unknown	East Coast	Sand Fulmar	Wrought iron handle	1
CEMEX_0340	251	East Coast	Sand Fulmar	Mammoth bone	1
CEMEX_0341	360	East Coast	Sand Falcon	Fossilised deer bone	1
Hanson_0342	240	East Coast	Arco Adur	Hydraulic jack from aircraft	1
Hanson_0343	240	East Coast	Arco Adur	Corroded aluminium from aircraft wreckage	1
Hanson_0344	127	South Coast	Arco Humber	Natural flint stone	1
Hanson_0345	127	South Coast	Arco Avon	Cannonball and nail	2
Hanson_0346	240	East Coast	Arco Adur	Pair of sounding leads	2
CEMEX_0347	107	Humber	Sand Fulmar	Timber	1
Brett_0348	441/340	Humber or South Coast	Brett Aggregates, Cliffe	Cannonball	1
Brett_0349	340	South Coast	Brett Aggregates, Cliffe	Action from a 20th century break-action air rifle	1
CEMEX_0350	107	Humber	Sand Falcon	Timber	1
CEMEX_0351	107	Humber	Sand Fulmar	Crinoid fossil	1
CEMEX_0352	102	Humber	Sand Falcon	Mammoth jaw bone fragment	1
CEMEX_0353	137	South Coast	Brighton	Fragment of late 19th century marmalade pot	1
Tarmac_0354	430/296/122-1A	East Coast/Owers	Erith	Mammoth tooth	1
Tarmac_0355	430	East Coast	Erith	Two chisels	2
Tarmac_0356	122-1 A	Owers	Erith	Timber with copper nails	1
Hanson_0357	106C	Humber	Arco Humber	Animal rib bone	1
CEMEX_0358	319	East Coast	Angerstein	Ship's timber	1
Hanson_0359	473 East	East English Channel	Arco Adur	Cannonball	1
Tarmac_0360	122-1A	Owers	Erith	Scapula fragment possibly from elephant	1
Tarmac_0361	430	East Coast	Greenwich	Bar shot	1
Tarmac_0362	122-1A	Owers	Greenwich/City of Westminster	Aircraft undercarriage locking mechanism	1
Hanson_0364	474 Central	East English Channel	Arco Adur	Cannonball	1
Hanson_0365	240	East Coast	Arco Avon	Ship's timber	1
Tarmac_0366	296	East Coast	Greenwich/ City of Westminster	Fragment of fuselage from a Supermarine Spitfire	1
Hanson_0367	372	South Coast	EMU Ltd Vessel	Animal bone	1
CEMEX_0368	473 East	East English Channel	Sand Fulmar	Ship's timbers and cannonball	2
Tarmac_0369	122-3	South Coast	Burnley Wharf	Spoon and fork	2
CEMEX_0370	251	East Coast	Sand Fulmar	Sponge fossil	1
Tarmac_0371	122-3	South Coast	Burnley Wharf	Spoon	1
Tarmac_0372	122-3	South Coast	Burnley Wharf	Timber with copper nails	1
Tarmac_0373	122-3	South Coast	Burnley Wharf	Pottery and ammonite fossil	2
Tarmac_0374	122-3	South Coast	Burnley Wharf	Three bricks	3
CEMEX_0375	Unknown	Unknown	Northfleet Wharf	Metal object	1
CEMEX_0376	137	South Coast	Brighton	Metal object	1

Specialists

Since the operation of the Protocol began, specialist advice has been sought from a number of experts in order to best interpret and understand the items discovered. The table below provides a list of all specialists contacted during the 2010-2011 reporting year.

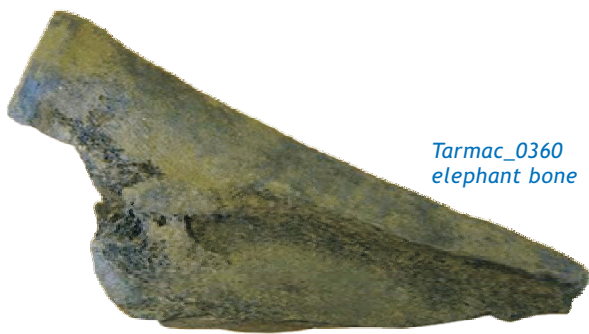
Specialists contacted in the past but not during 2010-2011 are still included in WA's internal lists, but have been omitted from the table below.

Expert	Specialism	Institution/Organisation
Ewen Cameron	Aircraft (hydraulic jack)	RAF Museum
Dave Carr	Aircraft	RAF Museum
Stuart Churchley	Ship timbers	Marine Archaeologist, Wessex Archaeology
Nicholas Cooke	18th century coin	Senior Project Officer, Wessex Archaeology
Andy Carrant	Ice age mammals	Collections Manager (Palaeontology), Natural History Museum
Bob Davis	Archaeological artefacts	Project Officer, Wessex Archaeology
Chris Ellis	Flint	Senior Project Officer, Wessex Archaeology
Jonathon Ferguson	Bullets	Curator of Firearms, Royal Armouries
Phil Harding	Flint	Senior Project Officer, Wessex Archaeology and archaeologist on Channel 4's Time Team
Lorrain Higbee	Animal bone	Zoo-archaeologist, Wessex Archaeology
Matt Leivers	Flint	Senior Finds Specialist, Wessex Archaeology
Phil McGrath	Artillery	Curator of Artillery, Royal Armouries
Lorraine Mephram	Finds specialist, ceramics	Senior Manager (Finds and Archives), Wessex Archaeology
Nigel Nayling	Maritime archaeology and dendrochronology	Department of Archaeology and Anthropology, University of Wales at Lampeter
Dave Parham	Ship timbers	Senior Lecturer in Marine Archaeology, Bournemouth University
Graham Scott	Maritime archaeology and underwater fieldwork	Senior Archaeologist (Coastal and Marine), Wessex Archaeology
Michael Simms	Fossils	Curator of Palaeontology, National Museums Northern Ireland
Andy Simpson	Military aircraft	Curator, Aircraft and Exhibits Department, RAF Museum
Tim Wallis	Aircraft	Michael Beecham Conservation Centre
Steve Webster	Maritime archaeology and underwater fieldwork	Senior Project Manager (Coastal and Marine), Wessex Archaeology

Case Study 1: Animal Bone and Changing Landscapes

In the 2010-2011 reporting year seven new animal bone finds were reported with the potential to teach us about Britain's submerged prehistoric landscapes. Three of these come from mammoth (CEMEX_0340; CEMEX_0352; Tarmac_0354), one from an elephant (Tarmac_0360), one from a deer (CEMEX_0341), a longbone fragment of a cow (Hanson_0367) and the rib of a horse or cow (Hanson_0357).

Animal bone can be a very important indicator of past climates and has the potential to suggest where human populations were living in the past, so all new animal bone finds are important.



Tarmac_0360
elephant bone



Hanson_0357
horse or cow bone



CEMEX_0341
deer bone



Hanson_0367
cow bone



CEMEX_0340
mammoth bone



Tarmac_0354
mammoth tooth



The Woolly Mammoth -
Mammuthus primigenius



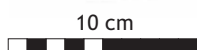
The Southern Mammoth -
Mammuthus meridionalis



The Steppe Mammoth -
Mammuthus trogontherii

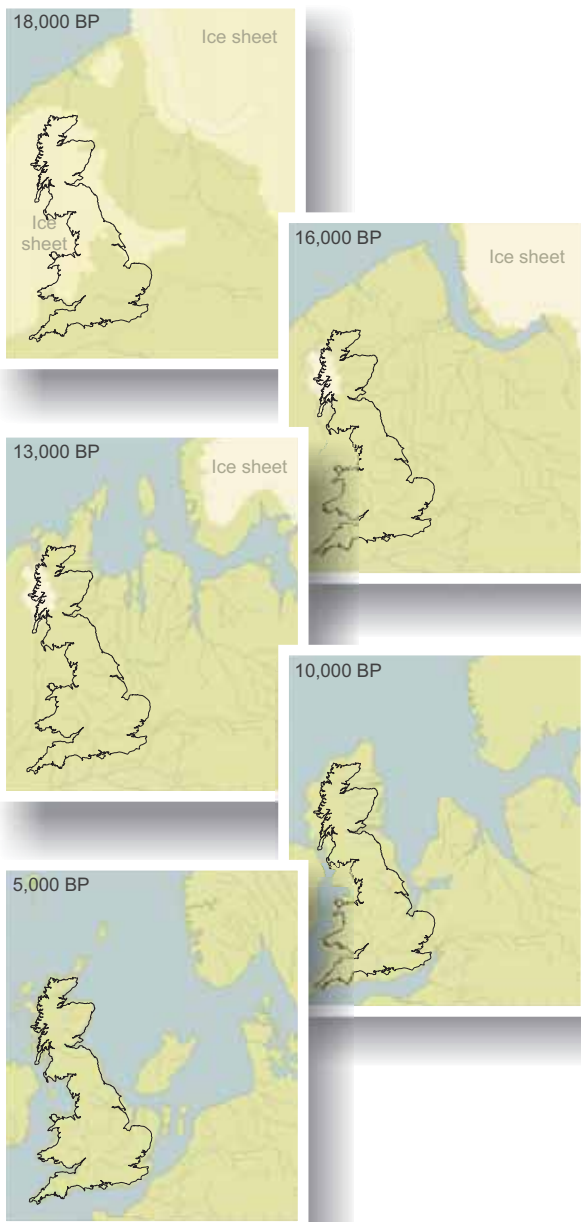


CEMEX_0352
mammoth bone



Recent archaeological evidence suggests that humans and our hominin predecessors have been present in Britain intermittently for nearly 900,000 years and some of the best evidence to learn about these people may lie underwater.

Earth's geological history is dominated by multiple glacial and interglacial periods. During a glacial period, or ice age, a large proportion of the world's water becomes incorporated in ice sheets, resulting in a fall in sea levels. During warmer interglacial periods, sea levels rise. When sea levels drop during a glacial period, parts of the English Channel, Irish Sea and North Sea may become dry land so that Britain can be joined to continental Europe.



At present it is not known exactly which currently submerged areas were exposed at any one time or the habitation patterns of people using areas exposed as dry land. Finds reported via the Protocol have the potential to enlighten archaeologists about these key issues, enabling us to better understand human activity in the past. Animal bone is especially important, as the species represented can teach us not only about where people might have been hunting, but also about the climate. CEMEX_0093 reported in 2007 was identified as a hippopotamus bone - an animal which prefers warmer temperatures. It was dredged from Licence Area 102 in the Humber region and implies that this area was once a balmy swampland. Conversely, the many finds of woolly mammoth remains can teach us about colder periods. Mammoth remains reported through the Protocol were the focus of an article in *Dredged Up 6* - published in Spring 2010.



CEMEX_0093 hippopotamus bone

Faunal or animal remains arrive on the seafloor in three ways:

- More recent remains may have been refuse or cargo lost overboard from a vessel;
- The animal may have died on land near a river and the remains washed out to sea;
- Finally, the animal may have lived and died on land that has since been submerged by rising sea levels. The discovery of prehistoric animal remains relating to times when the sea levels were lower are important and can inform archaeologists about where animals were living during these times.

It is the latter case that interests archaeologists studying the Old Stone Age or Palaeolithic.

The majority of animal remains recovered during marine aggregate dredging are isolated and/or fragmentary finds. Often, pieces of bone, tooth or antler are reported which are occasionally unidentifiable and lack any associated material. Where the finds can be identified, often only a broad date range can be given based on known evidence about the species. For example, mammoth remains are often reported through the Protocol and whilst it is not always possible to assign them an exact date of deposition, their age can be estimated from previous knowledge of the existence of each species.

Other faunal remains that have been reported through the Protocol include deer, horse, auroch (extinct ancestor of domestic cattle) and the hippopotamus bone from Area 102. Faunal remains relating to marine animals such as whales and sharks have also been reported. They are important as they can inform about interglacial periods, when sea levels rose and the landscape was perhaps similar to today.

Submerged prehistoric sites are difficult to locate. Unlike shipwrecks or aircraft remains they are less likely to show up during a geophysical survey, as animal bones and man-made flint tools are indistinguishable from the gravel in which they lie. Despite the many dredged finds relating to England's submerged landscape, it is still a vast area of unknown potential. The more finds of faunal remains, peat deposits, and flint tools that are reported through the Protocol, the more our understanding of these areas can be enhanced. Archaeologists can then continue to reconstruct England's submerged prehistoric landscape.

Other evidence of prehistoric landscapes

Palaeo-environmental material found within clay and peat deposits can enhance our understanding of submerged landscapes. Peat forms when plant remains rot in anaerobic conditions - those where oxygen is absent. This prevents the organic material from completely decomposing, so peat usually contains recognisable remains of many different plant and tree species and has the potential to contain man-made artefacts such as wooden tools or leather. Plant remains found within peat discovered at sea date to a time when areas being dredged would have been dry land. Peat that contains animal remains, charcoal or worked flint is of particular interest, as it may indicate a location where humans were butchering animals, lighting fires or making stone tools many thousands of years ago.

Man-made artefacts are also very important. Stone tools are primarily made of flint, although other materials may also be used. These tools may be recovered from the primary context, i.e. they have remained where they were initially deposited, potentially revealing a tool manufacturing site. Other tools dredged from the seafloor may show signs of damage or scuffing, having been moved from their original deposition site.

Significant flint tool and faunal finds were discovered in Area 240 in 2008 and featured in the 2007-2008 Protocol Annual Report. This led to the 2½ year Aggregate Levy Sustainability Fund (ALSF) project into this area, which revealed a landscape dating to the Middle Palaeolithic period, 200,000 - 300,000 years ago (http://www.wessexarch.co.uk/projects/marine/alsf/seabed_prehistory/area-240).

We would like to extend our warmest thanks to the animal bone specialists who have helped us identify dredged animal remains in the 2010-2011 reporting year - Andy Currant of the Natural History Museum and Lorrain Higbee of WA.

Case Study 2: Combining Protocols - Building a Picture Across Industries

The Marine Aggregates Protocol has proved to be an effective mitigatory option to protect our submerged heritage. Its results have been so well received by the curator and industry that similar models are now being extended to other industries and used on other commercial projects. Information from these combined protocols is greatly enhancing the archaeological resource for future generations.

Protocols for reporting archaeological material found during commercial work at sea provide a cost-effective safety net to ensure that finds are reported and protected appropriately. They negate the need to have an archaeologist on board every vessel or at every wharf, and the aggregates Protocol has demonstrated that with effective awareness training, industry staff can be highly efficient in identifying and reporting archaeological material. Building on this foundation, the Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) was launched in December 2010 by The Crown Estate, based on the Marine Aggregates model.

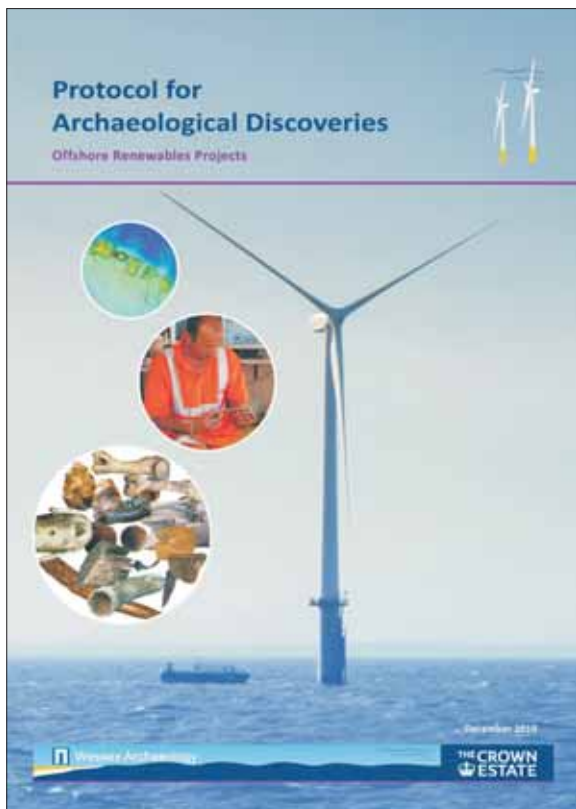
ORPAD combines an awareness training programme with resources for reporting finds of archaeological interest that are found during pre-construction and construction of offshore windfarms. It is one of several new protocols currently being considered or implemented to protect submerged finds during commercial offshore work.



In addition, a Finds Protocol for the fishing industry, funded by English Heritage, is currently being developed by WA. The aim is to support staff from offshore fisheries who may encounter archaeology during the course of their work and when an archaeologist is not present. It will be based on the existing tried, tested and successful Marine Aggregates Protocol format, which will be altered to make it fit for purpose to the fishing industry.

The basic system of reporting established by the marine aggregates Protocol is as follows:

Once a find is discovered, site staff should immediately report it to their Site Champion (a single individual such as a site manager, team leader or vessel master). The Site Champion completes a discovery form with key information including a description of the find and positional information. This form is then sent to the Nominated Contact - a single individual within each company. The Nominated Contact will upload this information to an online portal, which notifies the Implementation Service (currently WA). The Implementation Service will then respond with reports about the find and, where appropriate, send copies of this information to the client, developer, site staff, curators, and any other interested parties.



All protocols are designed to fit around the core work of site staff as a cost-effective solution to protecting archaeological discoveries. Depending on the needs of a new project and the nature of work being undertaken at the time of discovery, the system can be adapted from the above to support site staff working in other industries when dealing with finds of archaeological potential.

Other protocols have been and are being commissioned for site-specific developments too. For example, the construction of a large port in the Thames that involves development of the seabed has revealed some interesting pieces of archaeology which were reported through a Protocol. Staff working on the site were trained to identify items with archaeological potential and report them. Without the Protocol it is unlikely that these items would have been reported. However, with the Protocol in place the items are not only recorded by the location of the find but also researched by specialists to determine their importance. Some items may even end up in local museums.

A key element for any protocol is an effective programme of awareness training for site staff. It needs to inspire and encourage enthusiasm amongst staff to discover more about their submerged maritime heritage, something which the Marine Aggregates Protocol Awareness programme is already achieving.



The basic format of a protocol can be adapted to the type of development taking place and the methods being employed at sea. For example, the Offshore Renewables Protocol will potentially catch large ship timbers during grapnel dredges of cable routes, whilst the Marine Aggregates Protocol generally recovers smaller items, frequently metal. Training is therefore geared towards the different needs of site staff.



There is great potential for protocols as a source of understanding about our submerged heritage, as demonstrated by the many finds reported by the marine aggregates industry. Finds, even isolated ones, can build up to create a greater understanding of submerged heritage around the coast of Britain, as all finds are reported to EH and logged on the national database - the National Record for the Historic Environment (NRHE).

Information provided by finds reported through these protocols has the potential to improve greatly our understanding of submerged history. In addition, archaeologists can advise better on areas of high or low potential for archaeological discoveries. Combining information from multiple industry protocols can inform not only heritage professionals but also guide future offshore work, so that submerged archaeology can be protected for future generations. The BMAPA/EH/TCE Marine Aggregates Protocol is an excellent example that is now inspiring new industry protocols to achieve easier and cost effective treatment of objects of archaeological significance found at sea. Site staff should be commended for their commitment to the Protocol and for leading the way for offshore industries to protect submerged heritage.

Liaison and Accessibility

Details of each discovery have been sent to:

- Marion Page, NHRE and EH
- Mark Russell, BMAPA
- Mike Cowling, TCE
- Ian Selby, TCE
- Mark Wrigley, TCE
- Fiona Wynne, TCE

Details of discoveries regarded as wreck under the Merchant Shipping Act 1995 have been forwarded to the Receiver of Wreck. In the 2010-2011 the following reports were deemed to represent items of wreck:

- CEMEX_0333
- CEMEX_0334
- Tarmac_0335
- CEMEX_0339
- Hanson_0342
- Hanson_0343
- Hanson_0345
- Hanson_0346
- CEMEX_0347
- Brett_0348
- Brett_0349
- CEMEX_0350
- CEMEX_0353
- Tarmac_0355
- Tarmac_0356
- CEMEX_0358
- Hanson_0359
- Tarmac_0361
- Tarmac_0362
- Hanson_0364
- Hanson_0365
- Tarmac_0366
- CEMEX_0368
- Tarmac_0369
- Tarmac_0371
- Tarmac_0372
- Tarmac_0373
- Tarmac_0374
- CEMEX_0375
- CEMEX_0376

In the sixth year of the Protocol, several discoveries were made relating to military wrecks or aircraft. The following reports were therefore forwarded to the Ministry of Defence:

- Hanson_0342
- Hanson_0343
- Tarmac_0362
- Tarmac_0366

Although we have received a number of reports of artefacts relating to vessels, none of them relate conclusively to unknown and uncharted wreck sites. As no discoveries were found that are positively related to uncharted wreck sites, there was no need to forward any reports to the United Kingdom Hydrographic Office (UKHO).

Finds information has been sent to the appropriate PAS Finds Liaison Officers, to the Local Government Archaeology Officers (LGAO) and to the SMR/HER in the county which was most appropriate for the discovery. In the case of a discovery where the original location is known, this will be that location's relevant PAS/LGAO/SMR/HER, while in the case of discoveries made at wharves, with no find location information, it is reported to the wharf's nearest PAS/LGAO/SMR/HER.

Further details of liaison and the dissemination of data to interested parties are included in the wharf reports appended to this report.

Discussion

Importance

During the 2010-2011 Protocol reporting year a total of 40 reports were made through the Implementation Service. These 40 reports encompassed 49 separate artefacts.

To better understand the nature and distribution of archaeological material found during the 2010 - 2011 reporting year, finds have been mapped by distribution (opposite). This allows us to examine artefacts in their contexts, identify potential sites of archaeological interest and possibly predict which licences are likely to yield archaeological material in the future. This may aid future licence assessments within existing dredging regions.

During this, the sixth year of the Marine Aggregates Protocol, the value and importance of this form of mitigation has continued to be evident, not least from its adoption by other industries. Training industry staff to recognise and report archaeological material negates the need for costly watching briefs and helps to discharge licensing conditions. It is also an excellent example of good practice and protocols such as Marine Aggregates Protocol are being recognised nationally and internationally as an effective method of protecting our seabed heritage.

Key Issues

The Protocol Implementation Service is a continually developing process that reflects feedback from the marine aggregates industry. This year has seen improvements in several key areas, whilst other issues requiring investigation have been brought to WA's attention to ensure that the Protocol runs smoothly. These are discussed below:

Market Conditions

Market conditions continue to limit aggregate dredging activity and BMAPA official figures show that the total tonnage of material dredged dropped by 21% in 2010 (Source: The area involved - 13th annual report © Crown copyright (2011)).

This may account for the slight decrease in the number of reports filed this year (40 compared to 47 in 2009-2010), although archaeological material is not uniformly distributed on the seabed and some variation in the number of reports is expected every year, regardless of tonnage dredged.

This year saw a drop in the actual number of finds discovered compared to 2009-2010, which may relate to decreased dredging and the chance nature of the distribution archaeological material. It is important to note, however, that despite a significant drop in the number of individual finds dredged, the number of reports made decreased only slightly from last year.

Initial Reports

As stated in last year's report, it is crucial that archaeological finds discovered within dredged loads are reported to Nominated Contacts and to WA promptly to ensure that sites of archaeological potential can be protected in active dredge areas.

There has been a slight increase in the time taken to file reports from the 2009-2010 reporting year, with only a quarter of finds being reported to the Nominated Contact within one week of their discovery. Last year two-thirds of finds were reported within one week. Official guidelines drawn up at the inception of the Protocol state that finds should be reported to the Nominated Contact within two weeks of their discovery and whilst the majority meet this requirement, a few still fall outside the recommended time frame.

Timely reporting is crucial as it allows EH to identify and protect sites of archaeological importance on the seabed. Rarely, this may result in the creation of a temporary exclusion zone or a more permanent archaeological exclusion zone and where it does so, rapid reporting often means better locational information is available; thus any resulting exclusion zone will be smaller and have less impact on dredging activities.

Final Reports

Occasionally the Implementation Service takes longer than expected to produce and send final reports relating to dredged finds. Often this is due to a delay while waiting for external specialists who give their time gratis, to help us identify reported artefacts. When reports have been prepared they are sent to Nominated Contacts to distribute to wharves and vessels as appropriate. If a find report has not been received, please contact the Implementation Service team (protocol@wessexarch.co.uk 01722 326 867) and we will gladly send out any reports that you may not have seen. All the wharf reports prepared this year are appended to this report, except for those that are still being investigated.

Delays are also sometimes encountered while the Implementation Service seeks further information from industry staff about specific finds. Commonly this is in relation to cannonballs, which can only be identified if they are reported with their diameter and weight. When reporting any find, but particularly cannonballs, recording measurements, markings and any other information that you think might be relevant can dramatically speed up the reporting process. Despite this, reports from wharves and vessels are on the whole very informative and often need little clarification.

Photography

Photography has improved since guidance was issued last year on what makes an effective photograph ('Dredged Up 8' - available online) and the production of a photographic scale in 2009. The vast majority of photographs now uploaded onto the Implementation Service console are appropriately scaled, using either the scale issued or another identifiable object (a ruler, mobile phone or biro are good examples) and the majority of photos are detailed and well-focussed. Where an appropriate scale is not included in the photograph, for example where a find is too big, please continue to list dimensions in the initial report, to help the Implementation Service to understand the scale of the find and speed up the reporting process.

Locational Information

This year has seen a significant improvement in the locational information provided for finds, in relation to last year.

In the 2009-2010 reporting year eight reports came from unknown or uncertain dredging areas, compared to only three reports in the 2010-2011 reporting year. WA understands that it is not always possible to identify the Licence Area for finds when they are found at a wharf. In these circumstances it is better to report the find with any available information (for example possible Licence Areas or possible dredging region) than not to report at all. In the past, finds have been reported for which no Licence Area could be identified (for example where finds were discovered some time after dredging or on a discharge pile) and WA has recorded these as being discovered at the discovering wharf.

Conservation

During the 2010-2011 reporting year the Implementation Service has received further requests for advice on how to conserve dredged finds. Archaeological material that has spent a significant amount of time underwater is prone to becoming very fragile when allowed to dry out. Archaeological conservators frequently encounter this problem and often the only methods of drying and preserving an object safely are time-consuming and costly.

It is commendable that so many wharves are willing to protect the material that is dredged and many take pride in displaying dredged finds at their facilities. This is a praiseworthy undertaking, which not only keeps the Protocol at the forefront of company staff thinking but also demonstrates this aspect of the industry's responsible nature to others visiting the facility.

The Implementation Service has issued conservation advice through Awareness packs and through the 'Dredged Up' newsletter; the best course of action still remains to submerge any finds that are still wet or damp when discovered, in clean fresh water. WA appreciates that for many wharves storing material in this fashion is not only awkward but also unsatisfying, as it limits the opportunity to display material. For this reason, conservation will remain on the Implementation Service's agenda, to be discussed with EH and other parties where appropriate, and any further advice will be disseminated to all parties via Nominated Contacts and Site Champions or through 'Dredged Up'. In the meantime, if you have a find that you are concerned about, please contact the Implementation Service who will endeavour to advise the best course of action on a case-by-case basis.

Third Party / Protocol Awareness Crossover

The launch of the Offshore Renewables Protocol and associated Awareness Programme (see Case Study 2) has already seen benefits for heritage discovered through the work of the marine aggregates industry. The Marine Aggregates Protocol applies not only to wharves and vessels, but also to survey companies working on behalf of the industry. The Implementation Service received a report in the 2010-2011 reporting year from a survey company conducting a licence assessment on behalf of a BMAPA company. The find, an animal bone (Hanson_0367), was discovered on board a vessel contracted to EMU Ltd, during a monitoring survey in Area 372 off the South Coast. EMU staff had recently received Awareness training in support of the Offshore Renewables Protocol which enabled them not only to recognise the find, but also to report it in the correct fashion.

This unified approach which sees reciprocal benefits between protocols will continue into the future and archaeological discoveries reported through any offshore protocol will be considered together, to give us a more complete understanding of our seabed heritage.

Continental Wharves

In 2010 over one-third of aggregate dredged in British waters was delivered to continental Europe. The majority of this aggregate was from the East and Humber regions (nearly 74%). Despite Awareness visits in 2010, no finds have been reported from continental wharves. It is difficult to enforce the reporting of finds from British waters on the continent and there was some reluctance from continental wharves to be involved in the Protocol, despite being encouraged to do so by BMAPA members when receiving material from UK licences.

The Implementation Service will continue to keep communication channels open with continental wharves to encourage future finds reporting.

Artefact Patterns and Distributions

Since the Protocol began in 2005 the Implementation Service has received 245 individual reports encompassing over 830 finds. The quantity of finds reported allows us to identify and consider patterns of artefact distribution. This information is used to inform Licence Area renewals and applications. In addition, it is being used to inform other offshore archaeological projects, as the Implementation Service regularly receives requests for information about dredged finds from archaeologists working on other projects. Information about all finds dredged over the past 6 years is available online on WA's website.

Distribution of Artefacts by Dredging Region

There are eight dredging regions around the UK:

- The Humber;
- The East Coast;
- The Thames Estuary;
- The East English Channel;
- The South Coast;
- The Owers;
- The South West;
- The North West.

In past years evidence has shown that the majority of dredged finds have been retrieved from the South and East Coast regions - a trend which has continued into the 2010-2011 reporting year. To quantify this statistically, of the 245 reports made in the past six years of the Protocol (for which the dredging region is known), the East and South Coast regions' reports account for approximately 80% of the total - essentially unchanged from 2009-2010. One of the reasons for the enhanced number of finds from these regions is undoubtedly the volume of dredging that takes place here. In 2010, 4.87m metric tonnes of aggregate were removed from the East Coast region, and 3.43m metric tonnes of construction aggregate were retrieved from the South Coast region. This equates to just under 55% of the total aggregate removed from all eight regions during 2010 (Source: The area involved - 13th annual report © Crown copyright (2011)).

The least prolific regions in terms of finds reports are still the South-West and North-West regions, with no finds reported from these regions this year. As stated in previous reports, the South-West and North-West regions are targeted for sands and it is unlikely that archaeological material would pass through the screens used to grade dredged material before it leaves the seabed.

The 2010-2011 reporting year has seen an increase in the amount of finds reported from both the Humber and Owers regions, when compared to figures from 2009-2010. Six finds were reported from the Humber region (equal to approximately 15% of the total number of finds reported in 2010-2011) compared to three (equal to 6% of the total) in 2009-2010. Similarly, four finds were reported from the Owers region this reporting year (equivalent to 10% of the total finds reported) compared to just one find (2%) in the previous reporting year. These increases are thought to be due to the nature of the distribution of archaeological finds, rather than a specific increase in dredging in either region. An increase in finds may indicate a site of archaeological importance and further cargoes should be carefully examined. The finds dredged this year from the Owers and Humber regions have been studied with others found nearby in previous years and do not currently suggest an identifiable site.

Distribution of Artefacts by Archaeological Typology

Aircraft

In the 2010-2011 Protocol reporting year there have been four new reports of finds that can be confirmed as relating to aircraft remains (Hanson_0342, Hanson_0343, Tarmac_0362, and Tarmac_0366).

The majority of aircraft finds tend to be made around the South and East coasts of Britain where there were heavy losses during World War Two. This is reflected in the 2010-2011 finds, with three originating from the East Coast region and one from the South Coast dredging region. One of the three aircraft fragments dredged from the East Coast in 2010-2011 was identified as a fragment of fuselage from a Supermarine Spitfire. This was one of the most commonly-used aircraft in the Royal Air Force during World War Two and the find, Tarmac_0366, was identified from a serial number on a bolt.

Whilst the majority of aircraft remains are discovered within the South and East Coast regions, it is important to remain vigilant when working in all dredging regions, as material from an aircraft crash may be found anywhere.

Palaeolithic Finds

Seven reports that are likely to date to the Palaeolithic, or Old Stone Age, have been made during the 2010-2011 reporting year. The majority of finds relate to mammoth or elephant remains (CEMEX_0340, CEMEX_0352, Tarmac_0354, and Tarmac_0360), with deer, cattle and horse represented by the other finds. Palaeolithic finds are discussed more fully in Case Study 1.

Three fossils were also reported via the Protocol in the last reporting year. Whilst these finds are not technically archaeological, they should still be reported, as fossils have been used for adornment or decoration in the past, just as they are today. There is no evidence to suggest that this year's fossil finds (Cemex_0351, Cemex_0370 and Tarmac_0373) have been used in this fashion but it is possible that future finds may prove to have been.

Cannonballs

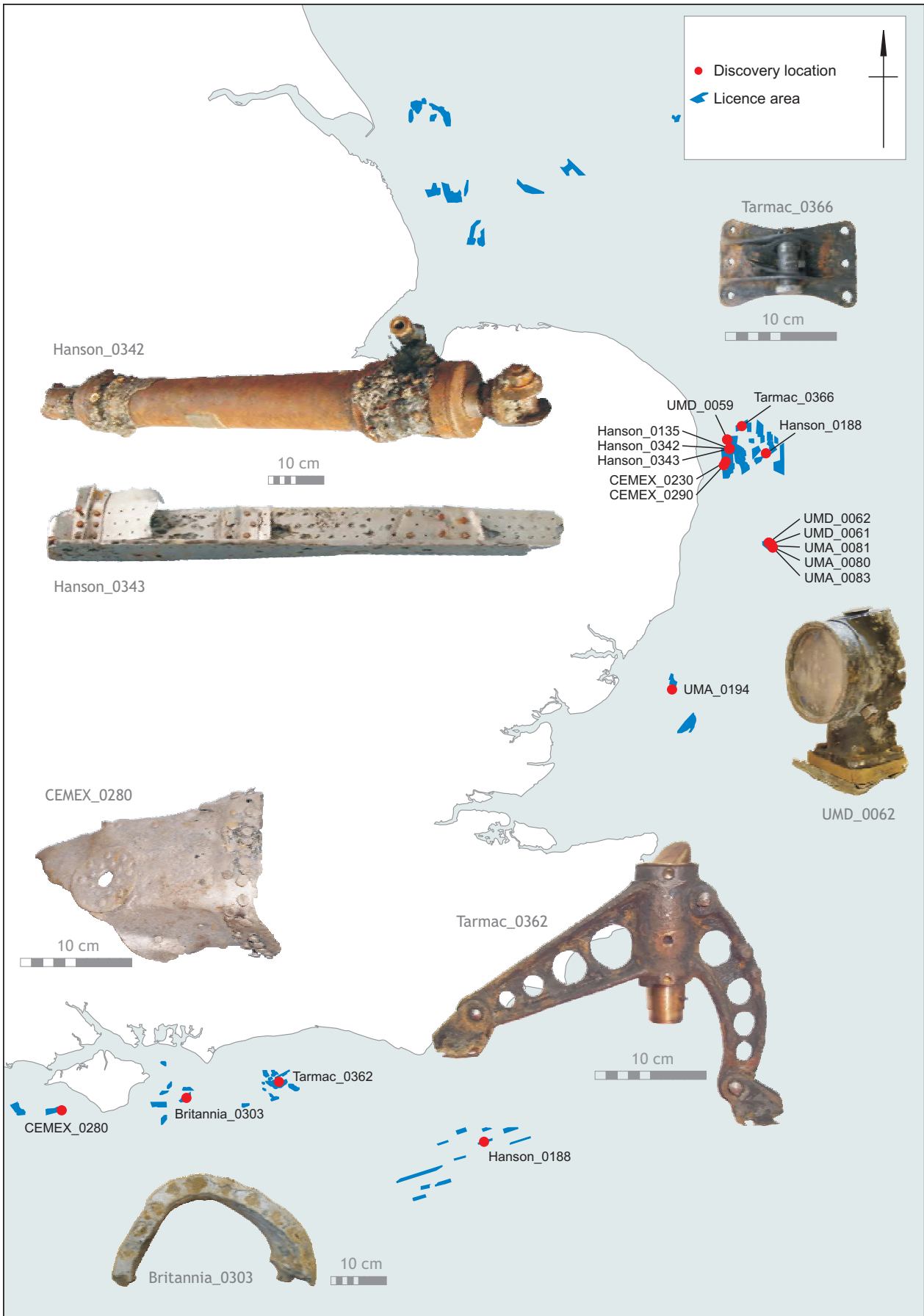
Cannonballs are frequently reported through the Protocol and survive well at sea, probably due to their density and general stability when buried in sediment. During the 2010-2011 Protocol reporting year, three cannonballs were reported from the East English Channel region, two from the South Coast dredging region and a complete bar shot from the East Coast region. These were the focus of an article in *Dredged Up 8*, published in August 2011.

Every cannonball reported through the Protocol is examined by experts at the Royal Armouries Museum. Where the item is in good condition, with its original weight and diameter available, it is often possible to identify which gun they were designed for and thus how old each cannonball is. However, this is not a simple task, as this type of ammunition was used on a variety of ships, both military and merchant, from the 15th century until the 19th century.

Wharf reports Britannia/Brett_0304 and 0305, and Tarmac_0312 and 0314 were dredged in 2009-2010 but are included in this year's report as these finds were awaiting specialist interpretation when last year's annual report was published.

Brett_0348





Location of finds relating to aircraft discovered over the past six years

Maritime Artefacts

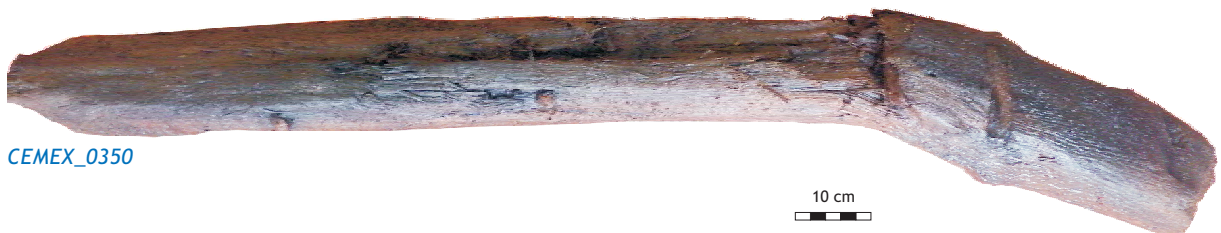
The 2010-2011 reporting year has seen nine separate reports of structural material thought to originate from ships, with eight relating to ships' timbers and one pertaining to a wrought-iron handle similar to those used on vessels. Two finds from Area 107 in the Humber region (CEMEX_0350 and CEMEX_0347) were identified as ships' timbers and, with the discovery of another timber from this region in 2010, it is important that further cargoes from this area continue to be carefully examined, as staff upon CEMEX's *Sand Fulmar* and *Sand Falcon* are currently doing.

In addition to these, there were numerous reports of items thought to have come from ships or shipwrecks, including a 1797 Cartwheel Penny (CEMEX_0335), the action from a late 20th century air rifle (Brett_0349), two sounding leads (Hanson_0346) and a fragment of a marmalade pot (CEMEX_0353).

The quantity of finds relating to vessels reported through the Protocol is not surprising, given Britain's long maritime history, and items from ships or shipwrecks can be expected in every UK Licence Area. Every area is carefully studied prior to the granting of a licence to dredge, to ensure that no known sites of significant archaeological interest are likely to be disturbed. However it is always possible that a new site will be discovered during the course of dredging work. It is for this reason that protocols such as this are in place and are proving to be an effective mitigatory option.

Post-War Debris

Five finds from Licence Area 122/3 off the South Coast, including cutlery, bricks and pottery, were reported this year. This Licence Area has previously revealed an assemblage of domestic debris which has been interpreted as domestic scrap or World War Two demolition debris deposited off the Isle of Wight. There is no official record of this having occurred, although the age of the material, where it can be ascertained, is consistent with this possibility. All finds, even those that may appear to be domestic, should be reported through the Protocol, as they may also be associated with a shipwreck.



Conclusion

The 2010-2011 reporting year has been affected by the continued poor economic conditions which have affected the construction industry as a whole over the past three years. Despite the very difficult financial outlook, the number of finds being recognised and reported is still high and the work of marine aggregate industry staff in protecting our submerged heritage should not be underestimated.

Reported finds give us an insight into a hidden world and allow us to study otherwise inaccessible places. By reporting archaeological finds through the Protocol, industry staff are not only satisfying licence conditions, but also playing an important role in protecting heritage for everyone. This is reflected in the continued requests for information about dredged finds received by WA to inform other offshore projects. In addition to this, the example established by the Marine Aggregates Protocol is being recognised across other industries as they begin considering protocols as effective mitigatory options when working offshore.

We would like to thank everyone who has reported finds and protected our heritage in the 2010-2011 reporting year, and throughout the last six years of Protocol reporting.

The Future

The Protocol Implementation Service continues to be run by WA and finds are reported regularly. If you have any questions about finds reporting and the Protocol, please contact WA via protocol@wessexarch.co.uk

Brett_0305 and Brett_0306: Two Cannonballs

These cannonballs were discovered by Tony Payne at Brett Aggregates Cliffe Wharf on 25 May 2010. They were dredged by *DEME Charlemagne* from Licence Area 461, which lies approximately 28 miles south of Eastbourne.



Photographs of these finds were shown to Phil McGrath, Curator of Artillery at the Royal Armouries Museum.

Brett_0305 has an approximate diameter of 3.38 inches and weighs 3.35 pounds. This ball would probably have been fired from a gun known as a Saker. The term saker was used from the 16th century and various versions of sakers were used by the English, Venetian merchantmen, the French and the Spanish Armada. The Saker family of guns existed in many different sizes but usually had a bore of between 3½ and 4 inches. In 1670s Samuel Pepys began a series of reforms of Charles II's navy including the standardisation of the ships. In general terms, and this applied to all classes of gun, those made for the later standardised government contracts had to be made within certain precise dimensions. If they did not they were either sold off for use on merchant vessels and became known as 'bastards', e.g. bastard saker, or were melted down and re-used by the foundry. Obviously it was not in a contractor's best interest to cast too many guns that the government inspector did not like. He would simply terminate the contract and that supplier then lost his most lucrative customer. It is therefore very difficult to be precise about positively and conclusively identifying cast-iron round shot, remembering also that the objects will suffer quite considerable weight loss and shape during the underwater corrosion process. The original projectile weight would have been between 4 and 6 pounds.

At 6 inches in diameter Brett_0306 would have been fired from a 32-pounder or demi-cannon. Again, there were many different sizes and weights for this class but generally speaking the gun bore was between 6 and 6.4 inches. Demi-cannons, usually of cast bronze, were commonly used in the 16th and 17th centuries.

Cannonballs can be interpreted in a number of ways establishing clues to their manufacture date and relationship to the area in which they were found. From the medieval period onwards the English Channel has played host to all kinds of naval warfare, with engagements leading to shipping losses by many different European nations. Although no known battles or skirmishes took place in Area 461 it should be noted that it is placed on the fringe of the international boundary between the UK and France and the current record of shipwrecks is unreliable this far offshore.

The discovery of two cannonballs in Area 461 may indicate a naval skirmish or they may have been fired as part of a training exercise. Just north of this area the Battle of Beachy Head was fought on 10 July 1690 between France and the Anglo-Dutch alliance during the War of the English Succession. During this battle the English and Dutch lost 11 vessels and these finds may have been associated with this event. Cannonballs were also used to weigh down cargo cast overboard (lagan) or these finds may have simply been lost during the wrecking of a vessel. Further finds discovered in Area 461 and reported through the Protocol could shed further light on activities in this region.

Information about this discovery has been forwarded to:

English Heritage
BMAPA
The Crown Estate
The Receiver of Wreck

National Monuments Record
Historic Environment Record for East Sussex
Local Government Archaeology Officer for East Sussex
Finds Liaison Officer (PAS) for Kent

Brett_0348: Cannonball



This cannonball was discovered at Brett Aggregates Cliffe wharf by Harry Gilham in December 2010. The origin of the find is unknown - it was either dredged by Beaver or MV Thames from Licence Area 441 in the Humber or Area 340 off the south coast.

Details of the cannonball were sent to Phil McGrath, Curator of Artillery at the Royal Armouries Museum.

This cannonball would have been fired from a larger type of Saker. The term saker was used from the 16th century and various versions of sakers were used by the English Navy, Venetian merchantmen, French vessels and the Spanish Armada. The Saker family of guns existed in many different sizes but usually had a bore of between 3½ and 4 inches. In England in the 1670s Samuel Pepys began a series of reforms of Charles II's navy including the standardisation of the ships.* In general terms, and this applied to all classes of gun, those made for the later standardised government contracts had to be made within certain precise dimensions. It is very difficult to be precise about positively and conclusively identifying cast-iron round shot, remembering also that the objects will suffer quite considerable weight loss and shape during the underwater corrosion process. The original projectile weight would be between 4 and 6 pounds.

The marking on the side of the shot, a protruding piece of iron and a square indentation (see image top right), suggest that this is one part of a bar shot. Bar shot (right) is a type of ammunition where two cannonballs are joined together with a bar. A complete bar shot has recently been recovered from Area 430 off the east coast.



When fired from a cannon the bar shot would spin on its trajectory however, it is not very accurate so needed to be fired at close range to its target. It stopped being used when wooden sailing ships were replaced by armoured steam ships, as their main target was masts and ship's rigging. Bar shot were designed to disable a ship for capture rather than sinking.

This find may have come from either Area 340 or Area 441. Area 340 is a route out of Portsmouth, and two cannonballs (UMA_0082) and ship's timbers (UMA_0090) have previously been found in that licence area too. It was an area of high naval activity. Area 441 has no recorded naval skirmish but there may still have been maritime activity.

This appears to be an isolated find. The cannonball may have been fired at another vessel and may indicate the location of a naval skirmish. However it may also have been fired during a training exercise. Cannonballs were also used to weigh down material cast overboard or simply lost during the wrecking of a vessel in a storm. Further finds from Area 441 or 340 may be able to shed more light on this discovery.

*Source: <http://www.royalnavy.mod.uk>

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Hampshire/Lincolnshire
- The Local Government Archaeology Officer for Hampshire/Lincolnshire



Brett_0349: Air Rifle

This break-action air rifle was found by Harry Gilham at Brett Aggregates Cliffe in aggregate dredged by the MV Thames in November 2010. The find comes from Area 340 to the south east of the Isle of Wight in the South Coast region.

Images of this find were sent to Jonathan Ferguson, Curator of Firearms at the Royal Armouries Museum in Leeds. He was able to identify the find as the action from a break-action air rifle from c. the 1950s to present day. He compared it to items in their collection but was unable to identify the make or model.

The oldest existing mechanical air gun dates to the late 16th century and in the 17th century air guns were used for hunting and warfare. Air guns had distinct advantages over the muskets and muzzle loading guns of the time as they could be fired in wet weather and rain, with greater rapidity and were quieter with no muzzle flash. However, problems with the operation and reliability of the guns meant that they never overtook the more traditional guns in popularity. Today, air rifles are used for hunting, pest control, recreational shooting and competitive sports.

The deposition of post World War II demolition debris is known around the Isle of Wight with domestic scrap and debris commonly reported. However, this rifle appears to be later in date and it is more likely that the find may have been lost overboard from a ship, either deliberately or accidentally. However, if further, similar items are found from the same area it may be shown to be indicative of a wrecking incident.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for the Isle of Wight
- The Local Government Archaeology Officer for the Isle of Wight
- The Isle of Wight Finds Liaison Officer (Portable Antiquities Scheme)



CEMEX_0330: Riveted Metal

This find was recovered by Jamie Keeble at Angerstein Wharf on the 6th of September, 2010. It was discovered amongst material dredged by the *Sand Fulmar* in Licence Area 447, which lies south of Felixstowe, in the Thames region.

This find has proven difficult to identify. The riveting and non-ferrous metal indicates that the artefact may have once been part of an aircraft. Images were sent to Andy Simpson and Ian Thirsk at the RAF museum for further inspection. Both experts could not place the item as having come from an aircraft but also couldn't rule it out. They did note, however, that red primer is unusual on aircrafts.

What we can tell from the artefact and the riveting style is that this is a reasonably modern piece of wreckage. Rivets are a form of fastener used to permanently join two items. A rivet has a smooth shaft with a head on one end. The original head is called the factory head and the other end is called the shop head or buck-tail. When a rivet is attached the end without the head is deformed so that it expands and is shaped into a head as well, therefore holding the rivet in place. Rivets are used regularly in aircraft construction and aluminium structures as they do not fail under repeated loads and tend not to corrode.

There are a number of ways in which this object may have found its way to the seabed however, there is a reasonably high probability that the find came from an aircraft and as such may indicate a crash site. We ask that staff continue to be vigilant while working in Area 447.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Essex
- The Local Government Archaeology Officer for Essex
- The Finds Liaison Officer (Portable Antiquities Scheme) for Essex



CEMEX_0333: Horseshoes

Two horseshoes were discovered at Angerstein wharf by Jamie Keeble. It was dredged on the 6th of September 2010 by the *Sand Fulmar* from Licence Area 447, which lies south of Felixstowe, in the Thames region.

The photograph of these two horseshoes was forwarded to Lorraine Mepham, Wessex Archaeology's Senior Post Excavation Manager, who identified them as modern horseshoes.

The development of horseshoes has a long history and there are many different styles and types. In ancient times people recognised that they needed to protect the feet of working, domesticated animals. In ancient Asia, for example, there is archaeological evidence that they wrapped rawhide or leather around the animal's hooves.

It is difficult to know when horse shoes were first used in Great Britain. This is because metal was a valuable commodity and any scrap was melted down and re-used making it unlikely to find discarded horseshoes.

Archaeological evidence shows that Romans protected their horses' feet with strap-on hippo-sandals. The evidence for nailed on shoes starts around the 5th century AD. By 1000 AD cast bronze shoes became popular in Europe with a move to iron in the 13th and 14th century. In the 19th century this changed to steel. It is difficult to tell whether these horseshoes are iron or steel due to the corrosion, however the style of shoe is distinctly modern, probably dating from the 19th century onwards.

These are the first horseshoes to be reported through the Protocol. There are several reasons for these objects being found in this area, either as a shipwreck's lost cargo of horseshoes, or horses being transported by a ship that sank, or possibly scrap metal cargo. They may also have ended up in the sea through coastal erosion.

Lorraine suggests that the evidence of nails visible in the photograph supports that these horseshoes had been used and were possibly on a horse when they ended up in the sea. In relation to location they may be connected to the heavy traffic of horses across the Channel during World War I, but this is just a hypothesis. It is possible that these horseshoes could indicate a shipwreck and further finds in this area could help clarify the situation.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estates
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Essex
- The Local Government Archaeology Officer for Essex
- The Finds Liaison Officer (Portable Antiquities Scheme) for Essex



CEMEX_0334: Ship's Timber

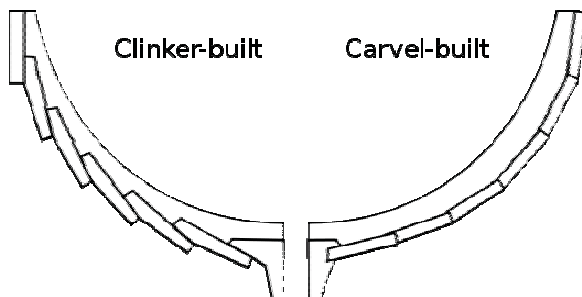
This find was discovered by M. Bednarski onboard the *Sand Falcon*. The vessel was working in Area 251, approximately 6 miles offshore from Lowestoft.

Images of this find were sent to expert Nigel Nayling from the University of Wales for analysis. Nigel has suggested that the artefact is a piece of oak timber ship frame. The marks in the timber indicate that there was at least one treenail through the timber. Treenails are cylindrical pins of wood used for fastening planking and timber. Treenails are driven through and wedged at each end to make them watertight. The use of this type of fastening is beneficial as it does not suffer from corrosion like iron nails and when water is added it expands creating a tighter fit.

Due to the timber type and markings it is almost certain that this find was once part of a sailing ship, however the damaged and eroded state of the timber makes it difficult to determine if it was part of a clinker or carvel built hull.

Clinker construction is a method of building boats and ships by overlapping planks. The butt, or side, of one plank sits on top of the other. This technique was originally used in Northern Europe and was commonly seen in Viking ships.

On the other hand, carvel construction involved the placement of plank butts end to end to form a smooth hull. Carvel construction was possibly created earlier than clinker but they developed at different times in different parts of the world. In Northern Europe carvel eventually replaced clinker. While clinker boats are still built today, carvel construction became the dominant ship building method in Northern Europe during the 15th century. For example the *Mary Rose*, built in the early 16th century was carvel.



The size, type and age of the vessel cannot be determined from this find alone. It is however a part of a ship and therefore is an important discovery as it may indicate a shipwreck in the area. We would like to remind all staff to remain vigilant while working in Area 251.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Suffolk
- The Local Government Archaeology Officer for Suffolk
- The Finds Liaison Officer (Portable Antiquities Scheme) Suffolk

CEMEX_0339: Iron Ship Fitting

This find was discovered on by N Wheatley 13 October 2010. It was found on board *Sand Fulmar* whilst the vessel was in dry dock and unfortunately there is no record of where this find may have been dredged.



This find was circulated round Wessex Archaeology's Coastal and Marine team. Isolated iron finds like this are often difficult to decipher. This find appears to be made of wrought iron, which was used on vessels for various fixtures and fittings and suggests a date of between mid 19th and mid 20th century.



Wrought iron was used before the development of effective steel making methods and the demand for wrought iron reached its height in the 1860s when ship technology had advanced to the construction of ironclad warships, such as HMS Warrior (pictured left). Also at this time railways were booming, and constructed using wrought iron rails. The production of wrought iron declined as mild steel became more readily available.

This artefact has a slight curve and is approximately 60cm in length with a loop at one end. It is difficult to determine the exact use of this fitting due to lack of context, however it may be deck fixture from a vessel that could have been used for a hand rail or similar, fixed to the vessel through the loop. It is likely to be an isolated find or may be an indication of a shipwreck in the area from which it originates – currently unknown. We would encourage vessels to report finds via the Protocol as soon as they are discovered to enable the best understanding of the archaeology of Licence Areas.

Information about this discovery has been forwarded to:

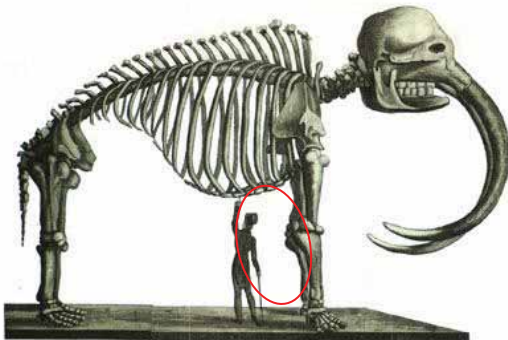
- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck



CEMEX_0340: Mammoth Bone

This bone was discovered on board *Sand Fulmar* by N Wheatley. It was dredged from Area 251, which lies off the coast of Lowestoft.

This artefact was correctly identified by vessel staff as being a mammoth bone. The bone was shown to Wessex Archaeology's Zooarchaeologist, Lorrain Higbee, who identified it as the right proximal radius or right top-end lower forelimb of a woolly mammoth (circled in red on the image below).



The age of the bone is unknown. Mammoth fossils occur in Britain within a broad date range from the Wolstonian ice age (380,000 - 130,000 years ago) to the end of the Devensian ice age (10,000 years before present). During the ice age the sea levels were much lower and Great Britain was joined with continental Europe by dry land.

There have been several mammoth finds reported through the Protocol including teeth and tusk as well as bone. Other prehistoric finds include ancient deer and cattle bones as well as stone tools used by man living in these areas during the ice age. The majority of these finds are recovered off the east coast of Britain.

The crew of the *Sand Fulmar* are commended for not only recognising and retrieving this artefact amongst a dredged load, but also for supplying accurate location information, which greatly enhances our understanding of this material and of the Licence Area.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record
- The Historic Environment Record for Norfolk
- The Local Government Archaeology Officer for Norfolk



CEMEX_0341: Deer Bone

This bone was discovered on board *Sand Falcon* by D.Brown. It was dredged in October 2010 from Licence Area 360, which is in the East Coast Region, lying approximately 20km north-east of Lowestoft.

On receiving the report of this find, photographs of the bone were sent to Lorrain Higbee, an animal bone specialist at Wessex Archaeology. Through examining the photographs Lorrain identified the bone as the metatarsal (foot bone) of a cervid (deer), specifically the red deer, also known as the *cervus elaphus*. Lorrain also informed us that the small circular hole at the end of the bone was not made by man but is a naturally occurring foramina (hole for blood vessels etc.)

Since the Protocol began in 2005, a number of animal bones have been reported. There are a number of reasons why animal bones come to be on the seabed. Animals were often carried on board ships as cargo and provisions, and as such it is possible that this bone ended up on the seabed as a result of a shipwreck or through waste disposal.

However CEMEX reported that the bone has been fossilised suggesting that it dates back to the Devensian period. This bone was probably deposited in this area during the last ice age, when the area being dredged today was dry land. During this time much of the planet's water was held in ice sheets and it was released when the Earth warmed around 10,000 years ago.

The discovery of further material from this area has the potential to enhance this interpretation and as such, future finds of archaeological interest dredged up from the seabed should be reported immediately.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record
- The Historic Environment Record for Norfolk
- The Local Government Archaeology Officer for Norfolk
- The Finds Liaison Officer (Portable Antiquities Scheme) for London

CEMEX_0347 and CEMEX_0350: Ships' Timbers



In early 2011 two timbers were dredged separately in aggregate from Licence Area 107. CEMEX_0347 was discovered on board the *Sand Fulmar* by N Coombs. CEMEX_0350 was discovered by M Bednarski on board the *Sand Falcon*. Licence Area 107 lies approximately 24km NE of Skegness.

These finds were examined by Wessex Archaeology's ship's timber specialist, Stuart Churchley. Both timbers are probably carved from oak – a common material used for the construction of wooden vessels in the past.

CEMEX_0347 has a length of 1.01m, width 140-149mm and thickness 52mm. The timber is likely to have come from a small vessel. Red paint is visible on the original surface at the originally cut end and also in small patches on one side. It is not clear if this was an original coat or if it was applied at some time later in the timber's functional life.



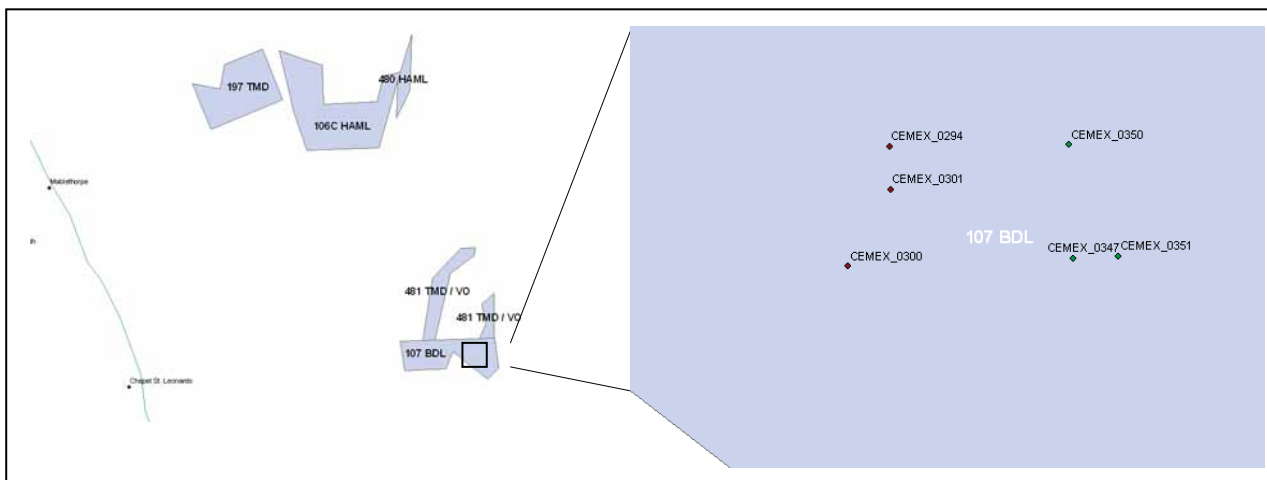
This timber was held in place with three treenails still visible as 17mm diameter holes (see image below right). Treenails are wooden dowels driven through holes in the timber and wedged at each end to make them watertight. They have been used for hundreds, if not thousands of years in the construction of boats and ships because they do not suffer from corrosion like iron and expand when wet, creating a tighter fit and securing the timber frames and planking of vessels. Two small ferrous nail holes are also evident, evenly separated along the timber. During vessel construction small nails were used as temporary measures to hold a timber piece in place before a more permanent fastening, such as a treenail or iron bolt.

CEMEX_0350 has a length of 1.71m, width 200mm and thickness 80mm. Due to its size and shape this timber probably formed part of the ship's framing – the struts around which the vessel is built. It is a relatively large timber, mainly straight with an approximately 20 degree angle natural bend at one end. It has been broken at one end of its straight portion although the original surface still exists along its length and at the bent end.

This timber was held in place with five 28mm diameter treenails, four of which are still in place. One treenail hole (right, circled in red) is cut on the edge of the plank and may have been drilled 'blind' where the shipwright couldn't see the timber as it was possibly sandwiched between outer hull planking and inner ceiling planking, for example. There is also a single possible iron nail hole in the timber at the end of the bent section of timber. This nail hole only goes halfway through of the timber's width and is therefore possibly also a 'blind' nail hole.



Assigning a date to this find is difficult. This example is likely date from the last 500 years due to its condition and survival. If further finds of this nature are discovered it may be possible to date those accurately using a technique called dendrochronology. This technique dates the wood based on the tree rings within it, which can often reveal the year a tree was felled and the country from which it originated. This could provide a date of construction of the vessel but the date of loss would remain unknown.



Over the past two years several finds have been reported from Area 107 (see above). Three timbers have been discovered within around 500m. CEMEX_0347 and CEMEX_0350 were found approximately 200m apart, and in March 2010 another timber was reported. CEMEX_0294 is thought to be a framing timber from a carvel-built vessel and may date to a similar period or even the same wreck as these recent finds.

As well as the timbers a leather shoe sole was also reported in the area (CEMEX_0300). This dated to the last 50 years and if it is associated with the timbers and a shipwreck, could provide a more accurate date.

There are no known anomalies or obstacles reported in this area. However, the fact that these timbers have been dredged in such close proximity gives a strong indication of the presence of a shipwreck in this area. Staff working on vessels in Licence Area 107, particularly on the eastern side, should remain vigilant for further finds.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Lincolnshire
- The Local Government Archaeology Officer for Lincolnshire



CEMEX_0351: Segment of Crinoid Fossil

This fossil was discovered on board the *Sand Fulmar* by N Coombs on 11th January 2011. It was found in aggregate dredged from Area 107 in the Humber region approximately 29km northeast of Skegness.

This find was identified by staff at CEMEX HQ as part of a Crinoid fossil. Identification was later confirmed as a fossilised disc-shaped columnal, which would have formed part of the stem of a crinoid.

Although they have the appearance of plants, crinoids are marine animals from the phylum Echinodermata, which also includes starfish and sea-urchins. Crinoids are commonly known as sea lilies. They are comprised on a base attached to the seafloor, with a stem leading to a crown, which has at least 5 arms used to capture planktonic food (see top right).

Crinoids lived and exist today in both in shallow and deep waters. There are only a few hundred known modern forms, but crinoids were much more numerous both in species and numbers in the past.

They are an important index fossil of the Palaeozoic Era (542-251Mya). Some thick carboniferous limestone beds dating to 280-220Mya are almost entirely made up of disarticulated Crinoid fragments.

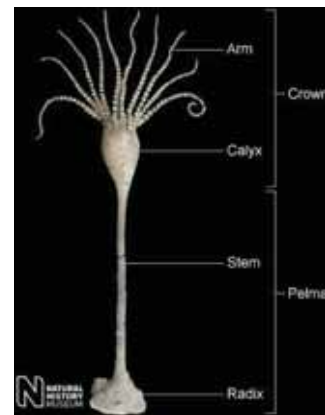
Although fossils are not archaeological artefacts, this find could still have an archaeological value. Fossilised crinoid stem segments are also known as St Cuthbert's beads (see image bottom right). These segments or "beads" were collected by people on the island of Lindisfarne (Holy Island) off the coast of Northumberland. These "beads" were threaded together into necklaces or rosaries. The exact date is unknown but is estimated between 1200 – 1671.

The fossil is approximately 10mm in diameter. Staff on board Sand Fulmar should be congratulated for spotting such a small find amongst a cargo of aggregate.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record for Lincolnshire
- The Historic Environment Record for Lincolnshire
- The Local Government Archaeology Officer for Lincolnshire

Reference: Natural History Museum (http://www.nhm.ac.uk/nature-online/earth/fossils/fossil-folklore/fossil_types/crinoids.htm)





CEMEX_0352 Mammoth Bone

In February 2011, this bone was discovered in by M Bednarski on board *Sand Falcon*. It was dredged with aggregate from Licence Area 102, which lies approximately 30km east-northeast of Grimsby.

The bone was shown to Wessex Archaeology's Zooarchaeologist, Lorrain Higbee who identified it as part of the jaw bone of a mammoth. Andy Currant from the Natural History Museum saw photos of the bone and although he was unable to identify the exact species he commented that it was a big example and is therefore likely to be from an adult mammoth.

The age of the bone is unknown. Mammoth fossils occur in Britain within a broad date range from the Wolstonian ice age (380,000 - 130,000 years ago) to the end of the Devensian ice age (10,000 years before present). During the ice ages the sea levels were much lower than today and Great Britain was joined at times to continental Europe by dry land.

There have been several mammoth finds reported through the Protocol including teeth and tusk as well as bone. Other prehistoric finds include ancient deer and cattle bones as well as stone tools used by man living in these areas during the ice age. The majority of these finds are recovered off the east coast of Britain.

The crew of the *Sand Falcon* are commended for their care of this find, which was well wrapped in a plastic bag and gaffer tape to aid preservation by preventing it from drying out.



© Natural History Museum

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record
- The Historic Environment Record for Lincolnshire
- The Local Government Archaeology Officer for Lincolnshire



CEMEX_0353: Marmalade Pot

This marmalade pot fragment was found by M Pettitt at Brighton Wharf in aggregate dredged by the vessel *Sand Harrier* on the 23rd January 2011. The find comes from Area 137 to the south-west of the Isle of Wight in the South Coast Region.

This fragment is part of a Dundee Marmalade pot from the later 19th century. Marmalade was introduced as a commercial product at the beginning of the 19th century by the firm James Keiller in Dundee.

A widely related story tells how a local grocer named James Keiller bought a large cargo of Seville oranges from a Spanish ship docked in Dundee harbour to shelter from storms. Finding it impossible to sell the bitter oranges to his customers Keiller is said to have passed them on to his wife Janet who used them instead of the normal quinces to make a fruit preserve. The marmalade proved incredibly popular and the family went into business to produce the product.

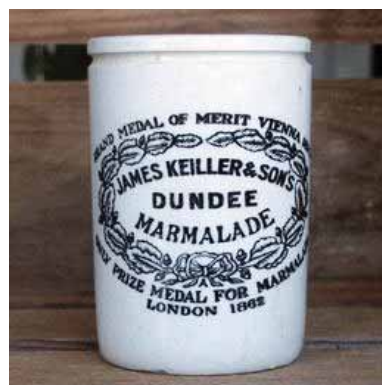
However, this story of the Keillers inventing marmalade is almost complete fiction with references to fruit preserves known from Greek and Roman texts. Rather, the firm James Keiller simply refined a version of the product known as 'chip' marmalade containing thick pieces of Seville orange rind as an aid to breakfast digestion. Keiller's Dundee Orange Marmalade became a registered trade mark in 1876.

This particular type of pot is commonly sold as an antique with examples commonly found in Victorian rubbish dumps. The full transfer print on these pots reads, "James Keiller & Sons Dundee Marmalade - Grand Medal of Merit Vienna 1875 – Only Prize Medal for Marmalade, London, 1862".

This fragment may have ended up on the seabed as an item of rubbish disposed from a Victorian, or later, vessel. If further, similar items are found from the same area it may be shown to be indicative of a wrecking incident.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for the Isle of Wight
- The Local Government Archaeology Officer for the Isle of Wight
- The Isle of Wight Finds Liaison Officer (Portable Antiquities Scheme)



CEMEX_0358: Ship's Timber

Derek Brown discovered this piece of ship's timber at Angerstein Charlton Wharf. It was dredged on the 19th of May 2011 by the *Sand Falcon* from Licence Area 319, off the East Coast between Lowestoft and Great Yarmouth.



Wessex Archaeology's ship's timber specialist, Stuart Churchley, examined photographs of this find.

This timber is likely to be that of a large boat or small ship. The dimensions are as follows: a length of 1400mm, a width of approximately 250mm and thickness 65mm. It is probably carved from oak – a common material used for the construction of wooden vessels in the past.

The photographs gave a reasonably good indication of some of the features found on the timber. Firstly, the timber has spent periods of exposure and burial within the seabed sediment, represented by the marine bore holes on one edge (that appear to be *teredo navalis* or shipworm as it is known).

The overall fashioning of the timber is difficult to tell. However, the slender thickness does possibly indicate a plank/ deck plank from a tree of poor quality due to the wavy grain, knots and on one side a branch that has been neatly cut at the time of conversion.

Assigning an accurate date to this find is not possible; however, this example is likely to be dating from the last 250 years due to its condition and survival.

On the opposing side, tool and score marks are evident at one end that possibly illustrate the joining to another timber by two small iron nail holes adjacently placed. It is not easy to say whether this is a scarf joint or compression from a perpendicular timber. Damage at the opposite end may suggest the timber was torn free of greater structural assemblage at some time.



Overall there are few other fastening holes that may represent a timber of little structural dependence, which means it was probably from the interior of the boat.

CEMEX discovered another ship timber (CEMEX_0295) in this Licence Area last year. There is no evidence to confirm if these timbers came from the ship or boat. CEMEX_0295 was a structural piece of timber from the ship's frame, while this timber is thought to have come from the interior so they were difficult to compare.

Further finds of ship timbers in this Licence Area, could indicate the location of a shipwreck. If further finds of this nature are discovered it may be possible to date those accurately using a technique called dendrochronology. This technique dates the wood based on the growth rings within it, which can often reveal the year a tree was felled and the country from which it originated. This could provide a date of construction of the vessel but the date of loss would remain unknown.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Suffolk
- The Local Government Archaeology Officer for Suffolk
- The London Finds Liaison Officer (Portable Antiquities Scheme)

CEMEX_0368 – Cannonball and Burnt Timber



N. Coombs found these artefacts on board the *Sand Fulmar*. They were amongst cargo from Licence Area 473 East, approximately 36km south of Eastbourne, Sussex.

These finds were dredged from the English Channel, approximately 36km South of Eastbourne in Sussex. They consist of a cannonball and a piece of burnt timber. It is not possible to say at this stage whether the two finds are connected or whether they were deposited on the seabed at the same time, though further finds from the area might enhance our understanding.

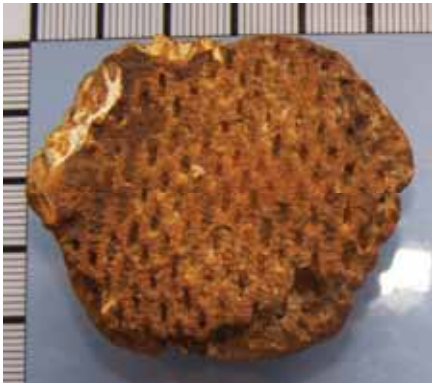
The cannonball weighs approximately 5lb and measures 5cm in diameter. It is relatively small as cannonballs go and has a large dent in one face. Phil Magrath, cannonball expert from the Royal Armouries Museum, has suggested that this was either caused by impact, telling us that this cannonball was fired from a gun and hit its target, or that the dent was caused by a fault during the manufacturing process. Cannon ammunition would have been improvised were a ship to run out of cannonballs so it is likely that even if a cannonball was damaged during manufacture, it would still be taken to sea for use if necessary. Cannons were used for over 600 years and in that time cannonballs changed little in their construction and appearance. Because of this it was not possible to determine the age of this example.

The burnt timber is likely to have come from a ship though this cannot be conclusively proven unless further finds are discovered nearby. Ships may have burnt on the water for several reasons - they may have burnt through accident, through damage sustained during battle or may have been burned deliberately for defence. There are numerous historical examples where unmanned ships have been set alight and directed at enemy vessels – fireships were used against the Spanish Armada when it was anchored at Dunkirk in 1588 and they were used against the Dutch during the battle of Beachy Head in 1690. If this timber is indeed from a burnt vessel it is likely that the remains of the hull are still on the seabed and so further cargoes from this area should be carefully inspected when dredged. Alternatively this timber may have been lost from a vessel, rather than with it, and as such may be an isolated find.

These finds will be added to our internal databases and any further finds from this area and those around it will be considered in relation to them as further finds from this area may change or enhance our understanding of this discovery.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- Ministry of Defence
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Sussex
- The Local Government Archaeology Officer for Sussex
- The Finds Liaison Officer (Portable Antiquities Scheme)



CEMEX_0370: *Rhizopoterion* Fossil

N. Coombs discovered this find on board the *Sand Fulmar* in September 2011. It was found amongst aggregate dredged from Licence Area 251, which lies approximately 14km east of Lowestoft in Suffolk.

This fascinating find was dredged from Licence Area 251 which lies off of the Suffolk coast. The incredibly regular net-like pattern on the base of the item was noticed by staff on the *Fulmar* and images of the find were sent to Dr Michael Simms, Curator of Palaeontology at Ulster Museum. He identified it as the surface of a fossil known as *Rhizopoterion*.

Rhizopoterion was a sponge – an animal that lives underwater. There are several different species of *Rhizopoterion* but it is not possible to identify which formed this fossil. Cemex_0370 is likely to have formed in the Upper Cretaceous period which spanned approximately 35 million years, beginning around 100 million years ago and ending 65 million years ago.



An example of *Rhizopoterion cribosum* –
courtesy of Ulster Museum

Dr Simms suggested that the fossil is embedded in flint, an observation confirmed by Wessex Archaeology. Fossils are not technically classed as archaeological finds as archaeology is the study of the human past and fossils typically formed many thousands of years before the first humans were present. However this is an interesting find and information about it will be passed on to relevant agencies.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate

These finds were discovered by Darryl Mason onboard the *Arco Adur*. They were found in material dredged from Licence Area 240, which is located in the East Coast region and lies 8 miles east of Great Yarmouth.

Hanson_0342 and 0343: Aircraft Wreckage



Hanson_0342: Hydraulic Jack



Hanson_0343: Tailwing Spar

These two aircraft wreckage finds were made at similar locations and so they will be reported together as they are probably from the same aircraft. Images of both finds were sent to Andy Simpson at the Royal Air Force Museum along with a written transcription of the information and AID stamp on the hydraulic jack (Hanson_0342). Andy suggested that the hydraulic jack was originally from an aircraft undercarriage or flap system. He then passed the transcription and images of the hydraulic jack to his colleagues for further comment.

Ewen Cameron suggested that the hydraulic jack's AID stamp, which says "MVAL 179", was possibly an acronym for Metropolitan-Vickers Aviation Limited. Initial research appears to suggest that this company name was not in use. However, there was a famous engineering company called Metropolitan-Vickers Electrical Limited (MVEL) that constructed planes during World War II. This company is known to have used AID stamps such as "MVA" and "MVAI", for aircraft manufacture, which demonstrates that the company referred to themselves in a variety of ways using a variety of AID stamps. The fact that these are similar to the one found on this hydraulic jack suggests that this hydraulic jack was made by MVEL.

This Manchester based company was founded in 1889 and specialised in heavy duty engineering, particularly industrial electrical equipment such as generators and steam turbines. During the war MVEL undertook a lot of work for the government, included developing ground radar and building autopilots for planes.



Avro Manchester – assembled but not made by MVEL.



Avro Lancaster – still flying today

Until 1938 MVEL did not make aircraft, an activity, which as they say themselves in their 50th anniversary publication was “the furthest removed from the normal range of work” (Dummelow 1949). At first they simply assembled Avro Manchester bombers, with the parts made elsewhere, but soon they were making their own aircraft and built a factory at Trafford Park for that purpose.

Aircraft construction became their main activity during World War II and they went on to build 1080 Avro Lancasters and 79 Avro Lincolns. MVEL were also one of the few aircraft manufacturers who built their own hydraulic jacks rather than use ones made by Lockheed or Dowty. As the AID stamp indicates that the jack was not made by either Lockheed or Dowty, this further supports the hypothesis that these finds were made by MVEL.



Avro Lincoln – never saw action in World War II

This therefore suggests that the artefacts discovered came from one of the three British multi-engine bombers constructed by MVEL. The second find (Hanson_0343) is a small fragment of what Ian Thirsk of the RAF Museum suggests is a tailwing spar, but unfortunately this does not shed any further light on the aircraft type. The AID stamp could mean it is one of the two planes actually constructed, rather than assembled by MVEL, the Lancaster and the Lincoln. Records show that there are surviving examples of both planes and an operational Lancaster flies in the RAF’s Battle of Britain Memorial Flight.

It is important to note however that MVEL, on occasions, also made undercarriage systems for Messier-Dowty, who built landing gear for a variety of allied planes and therefore it is, at this stage possible that these finds could come for a variety of World War II planes.

The fact that two finds are from the same plane and discovered in a similar location supports the possibility of an aircraft wreck somewhere in this area. Plane crashes can be spread over large distances and it is important that vigilance in this area continues so that the location and identity of this wreck can be verified. Further discoveries may help us to identify the type of plane and why it crashed. The Avro Lincoln did not become operational until August 1945 and therefore did not fight in World War II, so a crash site may not be due to battle as we might suppose from remains associated with this era.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- Ministry of Defence
- The National Monuments Record
- The Historic Environment Record for Norfolk
- The Local Government Archaeology Officer for Norfolk
- The Finds Liaison Officer (Portable Antiquities Scheme) Norfolk



Hanson_0344: Natural Flint

This find was discovered by N. McGill onboard the *Arco Humber*. It was found in material dredged from Licence Area 127, approximately 11 miles SSE of Christchurch, Dorset.

The find was initially thought by wharf staff to be an arrowhead, based on its shape and size. It was sent to Wessex Archaeology to be examined. The initial examination determined that it could not be an arrowhead because the bottom edge of the arrow was a natural break and not done by man. However it was possible it could have been a longer flint tool, possibly a blade that had broken. The flint really did look like a possible tool and so it was shown to three WA flint experts, Chris Ellis, Matt Leivers and Phil Harding (Time Team) to absolutely confirm it was in fact a natural piece of flint.

Flint tools are the most enduring type of tool known to man and have been used for over 700,000 years in this country alone. They are notoriously difficult to recognise, especially amongst aggregate, and staff on the *Arco Humber* are praised for picking this flint up for investigation, even though it was found not to have been worked.

The process used to make flint tools is called knapping. A knapper selects a flint nodule and a hard rock, or a piece of antler, and proceeds to hit the nodule to remove flakes of flint. The aim is to remove all of the cortex – the rough outer coating of the flint – and to knap a shape appropriate to the intended purpose. To make a knife, blade or arrowhead however, the knapper discards the core and uses one of the flint flakes that have been removed. This may then be reduced in size, normally using antler, until it is the desired shape.

Recognising flint tools is easier than recognising the flint flakes that are left as residue from knapping. The easiest way of recognising a flint flake is by identifying what is known as the 'bulb of percussion' which is the point at which that flake was struck when it was removed from the core (see example). A bulb of percussion is shown on the flint on the right. Unfortunately, if a flint has been broken or made into a tool, this bulb may be absent. Struck flint is razor sharp, sometimes even after thousands of years, and is sterile when first struck.

Hanson staff did exactly the right thing by reporting this find through the Protocol, even though it was found to be natural. All further finds that may represent worked flint or flint tools should be reported in the same way, or if staff are unsure as to whether a flint has been worked, please send images of it to Wessex Archaeology via protocol@wessexarch.co.uk. We are always happy to advise on each new find.



Example worked flint
(BMAPA)

Hanson_0345: Cannonball and Iron Nail

These finds discovered on board *Arco Avon* by Ian Johns in December 2010. They were recovered from aggregate dredged from Licence Area 127 off the south coast, approximately 20km south east of Bournemouth.



Details of the cannonball were sent to Phil McGrath, Curator of Artillery at the Royal Armouries Museum to confirm its identity. Cannonballs are difficult to definitively identify because similar styles were used by different countries and different classes of ship. At 6 inches in diameter this cannonball may have been fired from a 32-pounder or demi-cannon. There were many different sizes and weights for this class but generally speaking the gun bore was between 6 and 6.4 inches.

Although demi-cannons were powerful guns, they were not particularly accurate and therefore ships had to be positioned as close as possible to the enemy before firing their broadside - all the guns on one side - to cause as much damage as possible. Demi-cannons, usually made of cast bronze, were found arming the lower tier of 17th century English warships. They were also used in the 18th century on first-rate three-decker ships of the line, a type of naval warship. These ships carried up to 100 guns. Demi-cannon may also have been used by other countries including Dutch and French naval vessels.

The cannonball is likely to be an isolated find and may have been lost when it was fired from a vessel either during an attack or as training practice. There have been several cannonballs reported through the protocol from Area 127 (Tarmac_0314, Tarmac_0312, UMD_0224 and UMA_0077). If there was a naval skirmish in this area then the cannonballs could indicate the presence of a shipwreck. However, cannonball could be associated with lagan, which was when material was intentionally cast overboard and weighed down with something like a cannonball. This spot was then marked with a buoy so the materials could be collected at a later date.

The iron nail was shown to Wessex Archaeology's finds specialist, Bob Davis. He noted that is a rather large nail at approximately 12 inches, and seems surprisingly narrow. It does not appear to show any marks that it has been used. This style of pin would probably have been used for fixing large piece of wood together, perhaps as a holding pin before wooden treenails were driven through to secure ship timbers.

The nail is likely to be an isolated find. It appears to be unused and could be from a ships cargo or a spare on board a vessel and could still potentially indicate the presence of a shipwreck.

Information about this discovery has been forwarded to:

English Heritage	The National Monuments Record
BMAPA	The Historic Environment Record for Dorset
The Crown Estate	The Local Government Archaeology Officer for Dorset
The Receiver of Wreck	



Hanson_0346: 2 Sounding Leads

In December 2010, these artefacts were discovered by Darryl Mason onboard *Arco Adur*. They were dredged from Licence Area 240, which lies approximately 8 miles east of Great Yarmouth.

A photograph of these finds was shown to the diving team at Wessex Archaeology, who identified them as sounding leads.

Sounding Leads are used to determine the depth of water beneath a vessel. It is one of the oldest navigational instruments and has been used for over 2000 years. The lead was lowered over the side of a vessel and the line let out until it hit the seabed. By around 1600, the line attached to the lead was marked with a piece of material in fathoms (1 fathom for every 6ft of line).

It would be useful to know the weight of these sounding leads as different sizes were used on different vessels. Hand lead lines of about 25 fathoms were used with a lead weighing around 7 pounds (3.18kg) to measure coastal water depths of up to around 20 fathoms (36.5m). Greater depths were measured with a deep sea lead line weighing 14 pounds (6.35kg) and a line marked at intervals of 5 fathoms with knotted cord.

From the photograph you can see that the underside of the smaller sounding lead has a small dimple. This may have been used to determine the composition of the seafloor. The dimple would have been filled with tallow, a waxy substance that on contact with the seafloor would pick up sediment. Crew onboard would then know whether they were sailing over mud, sand or gravel which assisted their navigation and the charting of the seafloor.

It is likely that the leads are isolated finds lost overboard whilst in use. However because two were found together they could possibly indicate the position of a shipwreck. Vessels working in Area 240 should remain vigilant for further finds.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Norfolk
- The Local Government Archaeology Officer for Norfolk
- The Finds Liaison Officer (Portable Antiquities Scheme) for Norfolk

Sources: National Maritime Museum website



Hanson_0357: Animal Bone

Malcolm O'Neill on the *Arco Humber* discovered this animal bone. It was dredged on the 21st of April 2011 from Licence Area 106 C, in the Humber dredging region.

On receiving the report of this find, photographs of the bone were sent to Lorrain Higbee, an animal bone specialist at Wessex Archaeology. Lorrain identified the bone as a fragment of a rib, from a large animal such as cattle or a horse. It was not possible to date the bone.

Since the Protocol began in 2005, a number of animal bones have been reported. There are several reasons why animal bones come to be on the seabed.

Animals were often carried on board ships as cargo and provisions, and as such it is possible that this bone ended up on the seabed as a result of a shipwreck or through waste disposal.

The Protocol has also discovered prehistoric bones from animals that lived and died in this area. These bones are deposited in this area during the last ice age, when the area being dredged today was dry land. During this time much of the planet's water was held in ice sheets and it was released when the Earth warmed around 10,000 years ago, submerging ancient landscapes where animals and people once lived. Extinct large cattle, called aurochs, lived in this area during the ice age, and this bone could be an auroch rib bone. This find could therefore represent a prehistoric surface, submerged under the seabed or alternatively the bones could have washed in following their erosion from other sealed contexts.

However, there are no signs of fossilisation, which usually occurs when bones are very old. Unless more finds are made, it will be difficult to associate a date and a reason for its deposition on the seabed. It is important that finds such as this are reported as collectively they can identify the location of a shipwreck or ancient landscape.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Lincolnshire
- The Local Government Archaeology Officer for Lincolnshire
- The Lincolnshire Finds Liaison Officer (Portable Antiquities Scheme)



Hanson_0359: Cannonball

Darryl Mason on the Arco Ardur discovered this cannonball. It was dredged on the 18th of May 2011 from Licence Area 473 East which lies in the East English Channel region, south of Eastbourne, Sussex.

This cannonball is very similar to other recent cannonball discoveries, including one (Brett_0306) found in the English Channel aggregate dredging region in nearby Licence Area 461 and another recent Hanson discovery (Hanson_0345) found in a different dredging region.

It is 6 inches in diameter and weights 11.5 kilograms. Based on Wessex Archaeology's previous research it is probable that this cannonball would have been fired from a 32-pounder or demi-cannon. There were many different sizes and weights for this class but the gun bore was usually between 6 and 6.4 inches.

Although demi-cannons were powerful guns, they were not particularly accurate and therefore ships had to be positioned as close as possible to the enemy before firing their broadside - all the guns on one side - to cause as much damage as possible.

Demi-cannons, usually made of cast bronze, were found arming the lower tier of 17th century English warships. They were also used in the 18th century on first-rate three-decker ships of the line, a type of naval warship. These ships carried up to 100 guns.

There have been a significant number of cannonballs found in the East English Channel dredging region. This cannonball brings the total to ten; six from Licence Area 461 (Britannia_0242, Britannia_0244, Britannia_0305 and Britannia_0306) and three from Licence Area 458 (UMD_0264). This is the first cannonball found in Licence Area 473 East.

The cannonball is likely to be an isolated find, lost when it was fired from a vessel, rather than indicating the location of a shipwreck.

The discovery of so many cannonballs in this dredging region suggests that a skirmish or skirmishes may have occurred. The ability to be able to plot cannonball locations on GIS overlaid with historical information about battles can help archaeologists identify the true locations of famous historical battles. Just north of this area The Battle of Beachy Head was fought on 10 July 1690 between France and the Anglo-Dutch alliance during the War of the English Succession. During this battle the English and Dutch lost 11 vessels and these finds may be associated with that event. Further finds reported through the Protocol could shed further light on activities in this region.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for East Sussex
- The Local Government Archaeology Officer for East Sussex
- The Sussex Finds Liaison Officer (Portable Antiquities Scheme)



Hanson_0364: Cannonball

Darryl Mason discovered this cannonball. It was dredged on the 28th of April 2011 by the *Arco Adur* from Licence Area 474 Central, approximately 44km south-east of Eastbourne in the East English Channel.

Staff at Wessex Archaeology examined the photograph of this cannonball. From the photographs, it is estimated that the shot is made from iron and is 1.1 to 1.5 inches in radius. Currently the weight and the exact measurements of this find are unknown.

Nearly all the cannonballs reported through the Protocol are far larger, usually between 3 to 6 inches in diameter. This is a very small cannonball; it is thought that this cannonball would have been used in one of two ways.

Firstly, it may be a cannonball for a **Robinet**. A robinet, which is also known as a rabinett or rabinet, is a small gun which was used in the 15th and 16th centuries. The tradition of the time was to name guns after birds, hence the falconet gun was named for the falcon hawk and the saker gun was named for the saker hawk. A robinet typically weighed around 300 pounds and had a calibre of one inch, compared to the falconet at 500 pounds with a 2 inch bore or the saker at 1,400 pounds with a 3.65 inch bore. The robinet, being a smaller gun than both the falconet and the saker, takes its name from the French word for 'Rooster'. It was usually around 3.5 feet long in most cases, and with a bore of 1 to 1.5 inches. It was usually located at the front of a ship. According to the *Gentleman's Dictionary* (1705) this type of gun was seldom used. This is supported by armoury records for the Tower of London, "there never seem to have been more than a few in store in the Tower" (Blackmore 1976, 240).

Secondly, it could have been part of a group of small cannonballs shot together from a cannon with a larger bore. There are two main types of this kind of ordnance, the **grape shot** and the **tin-case shot**.

The **grape shot** involved putting a combination of small shot into a thick canvas bag, and cording it strongly together, to form a sort of cylinder whose diameter was equal to the bore of the cannon (Blackmore 1976, 243).

The **tin-case shot** involved putting small shot into a cylindrical tin-box, called a canister, which again fits the bore of the cannon. Iron nails and other metal could also be included in the canister (*ibid.*).

For any of the above the purpose of this cannonball was to attack the enemy crew, rather than the ship itself. Larger shot aimed to incapacitate the ship but this ordnance would wreak havoc on the ship's deck if it reached its planned destination.

This is one of the first finds in Licence Area 474 Central but there have been 11 cannonballs reported in the East English Channel dredging region, including the recent Hanson _359 discovery also made by the *Arco Adur* in Licence Area 473.

The age of the discovery is unknown. If a robinet cannonball it will date to the 15th or 16th century, while a grape of tin-case shot could be later. It would be useful to know the weight of the cannonball as this may help identify its use.

While it is likely to be an isolated find, lost when it was fired from a vessel, rather than indicating the location of a shipwreck, the discovery of so many cannonballs in this dredging region suggests the possibility of a naval skirmish in this busy and often disputed area of the sea. Further finds reported through the Protocol could shed more light on activities in this region.

Blackmore, H. L. (1976) *The Armouries of the Tower of London I Ordnance*. London: Her Majesty's Stationery Office

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for East Sussex
- The Local Government Archaeology Officer for East Sussex
- The East Sussex Finds Liaison Officer (Portable Antiquities Scheme)



Hanson_0365: Ship's Timbers

J. Quayle discovered these ship's timbers. They were dredged in June 2011 by the *Arco Avon* from Licence Area 240, 8 miles off Great Yarmouth in the East Coast dredging region.

This is an initial report for these two fragments of ship's timbers; experts would like to examine these discoveries further and get more details about measurements and markings, and we are hoping to receive them in the future. Dave Parham, Senior Lecturer in Marine Archaeology at Bournemouth University examined this photograph and provided some notes on the timbers.

One fragment is identified as a sheave. A 'sheave' is the name given to a wheel or disk with a grooved rim used as a pulley as part of a ship's rigging system.

Dave noted that the triangular recess in the middle of the sheave looks like the recess for a copper alloy bush that reduced wear on the sheave. These are seen in late 18th and early 19th century blocks from Royal Navy warships, like the wreck of the HMS *Venerable*. They continued in use into the modern era, although most wooden sheaves were replaced by metal ones during the 19th century.



HMS Venerables vs the French Alcmena
© Creative Commons; Wikicommons

It is unlikely that the sheave dates to earlier than the late 18th century because until then copper was an expensive metal. However at this time large scale copper production started and it becomes more common in ship building. Prior to this the sheave would have been made entirely of wood.

Without closer examination it is difficult to make any further comment on the other fragment of ship's timber. A broken sheave could be thrown overboard and therefore be an isolated find. However the discovery of the other fragment of wood in a similar location, suggests that there is a possibility of a shipwreck in this area. The discovery of further wreck material from the area would greatly enhance the possibility of pinpointing the location of a currently unidentified shipwreck.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Norfolk
- The Local Government Archaeology Officer for Norfolk
- The Norfolk Finds Liaison Officer (Portable Antiquities Scheme)



Hanson_0367: Animal Bone Fragment

This animal bone was discovered at EMU Ltd's Benthic Laboratory following a monitoring study in July 2011. It was recovered during trawl dredge sampling in Licence Area 372/1, which lies around 12km east of Shanklin, Isle of Wight.

This bone was examined by Lorrain Higbee, zoo-archaeologist at Wessex Archaeology. She determined that it is a fragment of the end of a long bone belonging to the leg of a cow. It appears to be unfused and therefore suggests an age for the animal at death of around 3 years.

Animal remains can appear on the seafloor in three ways. During times when the sea levels were lower many areas around the coast of the UK were dry land. Remains of animals living on this land are often found on the seafloor. Many of these animals, such as mammoth or aurochs, are now extinct.

Animal remains may be associated with a ship. Animals may have been carried as cargo or stored on board as food for crew on the journey. The remains may have been lost overboard during a shipwreck or may be waste from food eaten on board. Or thirdly they may have washed downstream and been deposited at sea via a river.

This bone is likely to belong to modern cattle and could date as early as medieval to post-medieval period (1066-1800AD). Cattle are very useful animals. They can provide milk, which can be turned into cheese, butter and yoghurt. Their flesh can be eaten as meat. Their skin can be processed as leather. They are strong and able to power farming equipment and pull carts. It is more likely that this bone was deposited on the seafloor from a vessel or via a river. The age of the animal, 3 years, is a prime age for butchery – although no butchery marks are visible on the bone. It seems that this animal may have been transported along the south coast either in trade or as meat to feed a hungry crew.

It is likely that this is an isolated find, particularly if it is waste from a vessel. However, further finds from this area may help to shed light on the origins of this bone if it is associated with a shipwreck or landscape change.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record
- The Historic Environment Record for Hampshire
- The Local Government Archaeology Officer for Hampshire

Tarmac_0310: Spoon, Copper Ring and Copper Panel

These finds were discovered by G. Cooper at Bedhampton Wharf. They were dredged by the *City of Chichester* off the South Coast. The Licence Area is unconfirmed but they are likely to have come from either Licence Area 127 (approximately 11 miles south of Christchurch) or 395 (approximately 13 miles south east of Portsmouth).



Photographs of these finds were shown to specialists. The spoon (top left) was examined by Wessex Archaeology's finds specialist, Lorraine Mephem. This spoon is a common design known as 'Old English,' which evolved in the mid 18th century and is still in use today. However, the use of nickel silver and the stamp on the handle back (pictured right) suggests a later date, probably no earlier than the late 19th century.



The metal panel has writing on it with "Fore Steaming & Bow" with "Port", "Fore", "Starbd" or starboard, and "Dimmer" with arrows next to each one. This find was shown to Maritime Archaeologist, Daniel Pascoe, who identified it as a control panel for the lights on a steamship. There would have been controls nearby the panel to switch lights off and on around the vessel. Steamships began to appear in Britain in the second half of the 19th century, this period included a huge change to ship technologies as vessels changed from wooden sailing ships to metal steamships.

A copper alloy ring was also reported via the Protocol. Isolated metal finds are often difficult to associate however due to the location of the find it is likely that it came from a vessel. Dave Rees from Bedhampton Wharf provided insight into this find, which he believes was wrapped around a projectile, most likely from WW2 ships. Inspired by this suggestion we contacted the Royal Armouries. Nicholas Hall, Keeper of Artillery, responded saying "Dave Rees was close in his suggestion. However, it is not thick enough to be what is called a 'driving band'. A driving band has to seal the force of the propelling charge on ignition, so it is also a 'gas check' and almost instantly rotates the heavy projectile by gripping the rifling [it is called 'engraving', and the rifling indents the driving band deeply]; the torque forces are very large. However, a steadying band was fitted to some large projectiles, just below where the projectile starts to become conical. This was much lighter than a driving band; I suggest that this find is a steadying band." The ring has a diameter of c.356mm (14 inches) and it may have come from a BL 14 inch Mk VII naval gun projectile, which were mainly carried on battleships, although two were mounted as coastal defence near Dover. There are no recorded enemy engagements in Areas 127 or 395 so the find could be the result of firing practice.

At present these appear to be isolated finds, however in the past year several finds have been reported in both Licence Areas, which could indicate the presence of a shipwreck. We ask staff to remain vigilant for additional finds when working in these areas.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Hampshire/Dorset
- The Local Government Archaeology Officer for Hampshire/Dorset

Tarmac_0312 & Tarmac_0314: Two Cannonballs



Two cannonballs were discovered by Robert Lawrence at Erith Wharf in May 2010. They were dredged by the *City of Westminster* with aggregate from Licence Area 127, in the South Coast region, which lies around 12 miles south-east of Bournemouth, Dorset.

Cannonballs are difficult to definitively identify because similar styles were used by different countries and fired from various types of cannon. Details of these finds were shown to Phil McGrath, Curator of Artillery at the Royal Armouries Museum.

Tarmac_0312 is a cannonball with a diameter of approximately 6 inches and would likely have been fired by a 32-pounder or demi-cannon. Demi-cannons, usually made of cast bronze, were found arming the lower tier of 17th century English warships although they may also have been used by the Dutch and French. They were also used in the 18th century on first-rate three-decker ships of the line, a type of English naval warship. These ships carried up to 100 guns. The demi-cannon had a range of 1600ft (490m) and although powerful were not particularly accurate at short range.

Tarmac_0314 is around 5 inches in diameter and is surprisingly light in weight. The culverin or 18-pounder is the type of gun from which this ball was made to be fired from. The culverin was adapted for naval use in the late 16th century. Due to its lightness in weight, it is possible that this cannonball is a shell. Shells are an explosive projectile made of iron, which were packed with powder. They would either detonate on impact or have a timed fuse cut to a specific length and ignited prior to firing.

In 1670s Samuel Pepys began a series of reforms of Charles II's navy including the standardisation of the ships*; this led to a more structured navy with standard armament and rigging on all vessels. This knowledge can assist with the identification of a wreck, where the associated guns and if the cannonballs are English can inform on the date and type of vessel.

Cannonballs can be interpreted in a number of ways establishing clues to their manufacture date and relationship to the area in which they were found. Cannonballs may indicate that a skirmish of some kind may have occurred there and could even indicate the presence of a shipwreck. From the medieval period onwards the English Channel has played host to all kinds of naval warfare, with engagements leading to shipping losses by many different European nations.

Area 127 was close to several recorded battles including Spanish Armada engagements to the south of the Isle of Wight. Other cannonballs have been found in this area (Hanson_0345, UMD_0224 and UMA_0077) therefore it is important that any finds discovered here are reported via the Protocol to help shed further light on this region.

Information about this discovery has been forwarded to:

English Heritage
BMAPA
The Crown Estate
The Receiver of Wreck

National Monuments Record
Historic Environment Record for Hampshire
Local Government Archaeology Officer for Hampshire
Finds Liaison Officer (PAS) Kent

*Source: <http://www.royalnavy.mod.uk>



Tarmac_0324: Bracket

This bracket was discovered on board *City of Westminster* in August 2010 and reported by Rob Barker. It was dredged from Licence Area 254, which lies around 12 kilometres east of Great Yarmouth.

This object is made of iron and measures approximately 36cm long by 5.5cm wide. There is a loop at one end suggesting a hinge. There are two 9cm sections welded on to the artefact, each has a loop, and there is a fragment of iron in the central section (see below right) suggesting that it was designed to hold something, which ran through both section loops.

It probably dates to between the mid 19th and mid 20th centuries and is made of wrought iron. The bracket may have been used to support cables running the length of a vessel, whilst being able to swivel.

At present, this bracket appears to be an isolated find and does not necessarily indicate a wreck site on the seabed. However, as other finds have been discovered in this Licence Area that are indicative of a shipwreck (Tarmac_0292 & 0293, silver tableware made at the end of the 18th century although the date of loss is unknown and Tarmac_0316, an anchor fluke that may have come from a 19th century vessel), and as there is a Temporary Exclusion Zone in place, staff should remain vigilant when working with material from Licence Area 254.



Close up of central upright

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Norfolk
- The Local Government Archaeology Officer for Norfolk



Tarmac_0332a: Mammoth Tooth

This mammoth tooth was discovered at Erith Wharf in August by M. Kirby & B. Gould. The objects were found in aggregate from the either the *City of London* or the *City of Westminster*. It is not known whether the material came from Licence Area 447, which lies south of Felixstowe in the Thames region or Area 296, which are off the coast of Clacton-on-Sea in the East Coast region.

This artefact was discovered along with a fragment of ship's timber reported separately as Tarmac_0332b. Both artefacts were sent to Wessex Archaeology for examination and detailed photography. The images of the tooth (Tarmac_0332a) were sent to Andy Currant, Curator of Mammal Remains at the Natural History Museum. Andy identified the tooth as a fragment of an upper cheek tooth of a fossil mammoth. The fragment consists of seven plates, a complete upper tooth would have had eighteen or more plates, so this fragment is preserving just under half the tooth.

The occlusal view (view of the biting part of the tooth) suggests a relatively young adult animal with slightly primitive teeth, possibly *Mammuthus trogontherii*, the steppe mammoth, a species associated with relatively warm conditions and a relatively open environment.

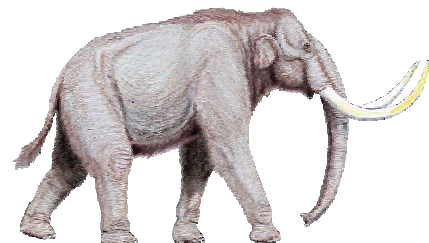
This species eventually gave rise to the Late Pleistocene woolly mammoth, *Mammuthus primigenius*, the species well-known from frozen carcasses recovered from high latitudes in the former Soviet Union and North America. Steppe mammoths in Britain show some signs of dwarfing towards the end of the Middle Pleistocene about 165,000 years ago – on the continent this is a notably large species, but the British equivalent shows some signs of being smaller – perhaps due to island isolation during the interglacial warm phase.



Occlusal view

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record
- The Finds Liaison Officer (Portable Antiquities Scheme) London



Tarmac_0332b: Section of Timber



This section of timber was discovered at Erith Wharf in August by M. Kirby & B. Gould. The objects were found in aggregate from either the *City of London* or the *City of Westminster*. It is not known whether the material came from Licence Area 447, which lies south of Felixstowe in the Thames region or Area 296, which lies off the coast of Clacton-on-Sea in the East Coast region.



The timber was discovered along with a mammoth tooth reported separately as Tarmac_0332a. Both artefacts were sent to Wessex Archaeology for examination and detailed photography. The timber was examined at Wessex Archaeology by Stuart Churchley and was found to be in poor condition, with deteriorated internal grain structure and numerous internal borer holes.

The overall length is 385mm, with an original surface at one end and a damaged end at the other. The timber is crudely shaped from a rough out timber (cylindrical in section) and appears to be surrounded by a thin layer of concreted iron. There are two small adjoining holes at the original surface end separated by a thin lip of concreted wood. A further fasten hole was identified 225mm down from the original stop end, and appears to traverse the timber, with an *in situ* iron nail/bolt. The function of these fasten holes is unclear.

Due to the fragmentary nature of the timber, it is difficult to make any clear judgments as to the original function of the timber although the presence of iron concretion demonstrates that the timber and mammoth tooth are not associated. The crude nature of workmanship suggests that it may have come from a low prestige shipping vessel, although, as the function remains unclear, it is also possible that it may have originated from a non maritime context. Despite these uncertainties, the timber is an important record which may prove valuable for the interpretation of further finds from these regions.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Finds Liaison Officer (Portable Antiquities Scheme) London



Tarmac_0335: Coin

This coin was discovered at Bedhampton Wharf by A. Farmiloe. It was dredged on 12th October 2010 by the *Arco Dee*. It was dredged from Licence Area 127, approximately 11 miles SSE of Christchurch, Dorset.

This find was shown to Wessex Archaeology's coin specialist, Nicholas Cooke, who identified it as a 'cartwheel' penny of George the III, minted in AD 1797 or shortly afterwards.

These large coins were introduced partly in order to prevent counterfeiting and forging, and partly to provide the public with a copper coin worth its weight in metal – the penny weighing in at one ounce, and the larger two penny piece containing 2 ounces of copper. These coins were struck in massive numbers in 1797 and 1798 on behalf of the government by the Soho Mint, owned by Matthew Boulton.

Some 500 tons of penny and two penny pieces were struck in 1797 and 1798 (all bearing the 1797 date) on a steam press capable of producing uniform coins. Their size and weight made them unpopular with the public however, and together with their appearance (with a raised rim and incuse engraving) led to them being christened 'cartwheels'. They were soon replaced with a smaller series of pennies and two penny pieces also struck in the Soho mint.

The front of the coin bears the image of King George III. The reverse bears the image of Britannia seated and looking right. The penny was entirely made of copper with no added metals to strengthen it. The example examined is both heavily worn and corroded.

The coin is likely to have lost overboard from a vessel but could indicate the presence of a late-18th/early 19th Century shipwreck in this area. Vessels working in this area should remain vigilant for additional finds.

Information about this discovery has been forwarded to:

English Heritage
BMAPA
The Crown Estate
The Receiver of Wreck
The National Monuments Record
The Historic Environment Record for Dorset
The Local Government Archaeology Officer for Dorset
The Finds Liaison Officer (Portable Antiquities Scheme) Dorset



Cartwheel Penny, 1797 ©
Birmingham Museums and Art
Gallery



Tarmac_0354: Mammoth's tooth

Graham Burbeck discovered this mammoth's tooth at Erith Wharf in March 2011. It was found in material dredged by either the *City of London* or the *City of Westminster*. It is not known if dredged material came from Licence Area 430 or 296 in the East Coast region or Licence Area 122/1A in the Owers region.

Wessex Archaeology staff identified this discovery as a fragment of a prehistoric mammoth tooth, which has fossilised. However, it is difficult, due to only a fragment surviving, to identify what species of mammoth; it is also possible that this tooth could belong to a species of elephant.

The earliest evidence for mammoths dates to 4.8 million years ago, long before the earliest evidence for human occupation. Archaeologists are interested in the discovery of mammoth remains that date to periods of human occupation in the UK, from around 700,000 years ago. Mammoths, like many animals, were a valuable resource and give us an idea of the environment at that time.

The remains of mammoths may end up in marine contexts having been washed from terrestrial deposits by rivers or eroded from cliffs or beaches. Alternatively, they may date to a time when the seabed was dry land, explained further below.

Prehistoric Climate Change

During the last 2.5 million years, known as the Pleistocene on the geological timescale, there have been numerous cold periods, called 'glacials', separated by warmer periods called 'interglacials'. During colder periods, large continental ice sheets covered much of Britain and most of the North-west European Peninsula. At these times sea levels were low and large expanses of land, now forming the seabed of the North Sea and the English Channel, were available to humans and animals. Human occupation usually occurred at the beginning and end of a glacial period when the climate was warmer, but sea levels were still quite low. During warmer phases the glaciers melted and sea levels rose. The end of the last glaciation began around 12,000 years ago. By 10,000 years ago, many areas where people once lived, became submerged for the last time. Sea levels continued to rise after this.



The coastline of the United Kingdom around 10,000 years ago. This shows how the coastline began to recede as sea levels rose.

Discoveries of prehistoric material, including stone tools, identify locations where people once lived, which are now submerged under the sea. This evidence is often buried under seafloor sediments, and therefore difficult to find.

In the past discoveries of mammoth teeth dating from the Wolstonian glaciation (380,000 to 130,000 years ago) to the end of the Devensian glaciation (c. 10,000 years ago) have been discovered off the coast of the United Kingdom. Their locations could indicate prehistoric landscapes where people once lived. The location of this find is unclear, it may possibly come from the East Coast or Owers dredging region. The majority of mammoth teeth reported through the Protocol were located in the East Coast region. Significant evidence for prehistoric activity has been found in this region in the past, including a variety of prehistoric stone tools, such as hand-axes, and mammoth bones found together in Licence Area 240.

Isolated finds like this discovery, where location is uncertain, are still useful as they are reminders to remain diligent in these areas for further finds. Further dredging in Licence Areas 430, 296 or 122/1A may lead to more discoveries, which can confirm the location of this find and identify the location of submerged prehistoric activity.



Stone hand axes found through dredging and dating to the Middle Palaeolithic (Early Stone Age)



Mammoth

This can help build up a picture of what life was like in the past.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record
- The London Finds Liaison Officer (Portable Antiquities Scheme)





Tarmac_0355: Two Chisel Fragments

Graham Burbeck and Barry Gould discovered two chisel fragments at Erith Wharf in March 2011. They were found in material dredged by either the *City of London* or the *City of Westminster*. It is not known if the dredged material came from Licence Area 430 or 296 in the East Coast region or Licence Area 122/1A in the Owers region.

Bob Davis, a finds expert at Wessex Archaeology, identified the probable use of these two finds as chisels.

Each tool is made from wrought iron. The larger is wedged shaped and is 70mm long, 14mm wide (at the widest point) and 12mm thick. The smaller is pointed and is 55mm long, 14mm wide (at the widest point) and 12mm thick (at widest point). You can see traces of grooves on two opposite sides of each chisel, as evident in the photograph.

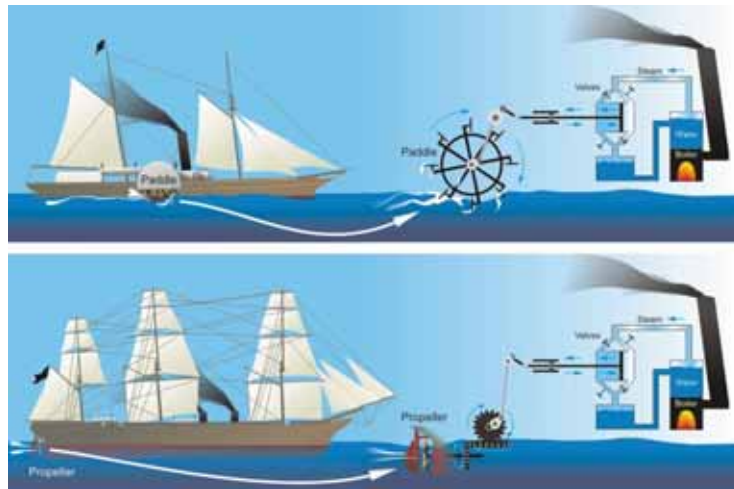


It is clear that both are only part of a tool. They are incomplete, broken where there was once a hole at the top. A long wooden handle would have been inserted into this hole. These chisels are called hot chisels as they would have been used to cut hot metal, rather than cold. This is why they need a long handle, to keep the blacksmith's hands away from the metal.

It is possible that these two chisels are both part of the same tool, each facing outwards on opposite sides creating a double head, but equally and more traditionally they would be two separate chisels. It is also important to note that the condition of each fragment is different, the larger wedged fragment is far more eroded. This could have been caused by the way the discovery deposited itself in the seabed.

The fact that both irons have obviously been used and broken indicates that these finds were not cargo. It is likely that they were discarded from a ship or indicate a shipwreck. While until the late 19th century ships were predominantly made of wood, key parts were made of iron. For example during the 18th and 19th century when wooden mast ships were often also steam powered, using either a paddle or later a propeller or screw.

Blacksmiths are often mentioned as part of the crew on ships, particularly on long journeys. In June 1770 Captain James Cook's ship, the *HMS Endeavour*, collided with the Great Barrier Reef and became stranded. Historical records show that she was made seaworthy by the ship's blacksmiths and carpenters (Great Barrier Reef 2011).



Steam technology used in 18th and 19th century ships, required iron parts

Blacksmiths also provided weapons for the ship and goods to trade with natives. In 1802 when blacksmith John R Jewitt (1783 - 1821) was taken on as the armourer for the *Boston*, part of his job description was to make “hatchets, daggers and knives for Indian trade” (Jewitt 1815). His memoirs tell of how, because of his skills, he was the only surviving member of his crew after an attack from natives of the Island of Nookta. They kept him prisoner for over a year.

During the 19th century, iron became more common in shipbuilding and therefore the need for a blacksmith on board became even more essential. For example the screw steamship *Diana* went on a 14 month whaling expedition in 1866, the blacksmith, as with all whaling ships, was a high-ranking member of the crew (Hull Maritime Museum 2011).

It is not possible to date these finds. In addition, the location of these finds is unclear, they may possibly come from the East Coast or Owers dredging region. Isolated finds like this discovery, where location is uncertain, are still useful as they are reminders to remain diligent in these areas for further finds. Further dredging in Licence Areas 430, 296 or 122/1A may lead to more discoveries, which can confirm the location and date of this discovery and possibly identify the location of an ancient shipwreck.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The London Finds Liaison Officer (Portable Antiquities Scheme)

Great Barrier Reef (2011), The discovery of the Great Barrier Reef, [online], available at < <http://www.the-great-barrier-reef-experience.com/discovery-of-the-great-barrier-reef.html>> [August 2011]

John, J. Hewitt (1815), A Narrative of the adventures and sufferings of John R. Jewitt.

Hull Maritime Museum (2011), Voyage to the Arctic: A Whaler's Tale, [online], available at < <http://www.mylearning.org/voyage-to-the-arctic-a-whalers-tale/p-2641/>> [August 2011]



Tarmac_0356: Timber with Copper Nails

Graham Burbeck and Barry Gould discovered this timber at Erith Wharf. It was dredged on 17th of March 2011 by the *City of Westminster* from Licence Area 122/1A, off the South Coast near Bognor Regis.

Stuart Churchley from Wessex Archaeology, who has expertise in ship's timbers, studied this discovery. His conclusions about the timber are presented below.

The overall dimensions of this timber are as follows: A length of 460mm, a width of 105mm and a thickness of 85mm. Although only a small fragment, with two ends appearing to have been torn free, there are three different sizes of fastening and numerous additional tacks, only situated on one face.

The first is a centrally placed copper bolt, approximately 360mm long and with a 25mm diameter, and clinched within a 35mm ring. The end appears to be originally rounded, with the length of the bolt shaped like a question mark.



The second fasten hole is situated at one end, it potentially illustrates a treenail hole, with a 28mm diameter and no corrosive staining from metallurgic or alloy based fasteners. It also appears to have been placed within a knot or possibly side branch.



The third is a 14mm diameter hole situated at the opposite end, and appears to be from a copper bolt slightly smaller in section the centrally positioned one.



The copper tacks are only 2.5mm in diameter with a squared section tapering to a point.

Dating from fastenings alone can be difficult to do accurately, especially with the three types of fastenings used, all of which were consistently used in timber construction of watercraft from the 5th century BC onwards. However, copper was notably more expensive than iron and used extensively by the Admiralty from the mid to late 18th century onwards. It has been said that vessels were not copper fastened unnecessarily. However, the crude nature of the timber with knots and wavy grain possibly illustrates an original timber function of less fundamental or prestigious significance. However, it could be that the wood has degraded during its time on the seabed.

Experiments into the strength of iron and copper bolts from 1863 illustrated no great difference in tensile force needed to break them. The main difference being that under pressure a copper fastener would normally break, when clenched or through clinched bolts, while iron would spring loose. In this case, however, the copper bolt has sprung loose. This suggests that the copper is very good quality.

The reason for the dramatic twist in the copper bolt may be due to the forces at work from the draghead removing the timber from its attached assemblage, which is also illustrated from the two other fasteners at either end showing signs of breaking.

The timber may also have been forcibly removed prior to deposition on the seabed and potentially used as a block for other uses within a ship or boat yard, illustrated by the numerous copper tacks, however this may also have occurred while in position within a vessel. While the bolt does not appear to be clinched at both ends, at the same time it is not clenched. It appears to be driven blind rather than clean through, with the bolt completely intact representing a fine casting with clean elements.

There have only been a few discoveries made in the Owers dredging region, and only one animal bone from Licence Area 122/A. However, this is an area where there has been considerable maritime activity in the past. As the above suggests this artefact could have resulted from the discovery of a shipwreck, although it is also possible that this was an isolated find thrown overboard from a ship. It is important to remain vigilant in this area and report any further finds immediately as they may identify the location of an ancient shipwreck.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for West Sussex
- The Local Government Archaeology Officer for West Sussex
- The London Finds Liaison Officer (Portable Antiquities Scheme)



Tarmac_0360: Animal Bone

Robert Lawrence discovered this bone at Erith Wharf. It was dredged on 28 April 2011 by *City of Westminster* from Licence Area 122/1A, off the South Coast near Bognor Regis.

Andy Currant, Curator of Mammal Remains at the Natural History Museum examined photographs of this discovery. He suggested that this is a fragment of scapula from a large animal, probably an elephant. Lorrain Higbee, bone expert, from Wessex Archaeology, examined the bone and noted that it is badly abraded and so it is difficult to draw any further conclusions. She noted that it was quite mineralised and therefore could date to prehistoric times.

It is possible that this could be a mammoth bone. Andy tells us that whilst all mammoths are elephants, not all elephants are mammoths. So it could have come from a mammoth such as the Woolly mammoth or the Steppe mammoth, both of which inhabited Britain at some point in the past.

The earliest evidence for mammoths dates to 4.8 million years ago, long before the earliest evidence for human occupation. Archaeologists are interested in the discovery of mammoth remains that date to periods of human occupation in the UK, from around 700,000 years ago. Mammoths, like many animals, were a valuable resource and give us an idea of the environment at that time.

The remains of mammoths or elephants may end up in marine contexts having been washed from terrestrial deposits by rivers or eroded from cliffs or beaches. Alternatively, they may date to a time when the seabed was dry land, explained further below.

Prehistoric Climate Change

During the last 2.5 million years, known as the Pleistocene on the geological timescale, there have been numerous cold periods, called 'glacials', separated by warmer periods called 'interglacials'. During glacial periods, large continental ice sheets covered much of Britain and most of the North-west European Peninsula. At these times sea levels were low and large expanses of land, now forming the seabed of the North Sea and the English Channel, were available to humans and animals.



Human occupation usually occurred at the beginning and end of a glacial period when the climate was slightly warmer, but sea levels were still quite low. At the height of the warmer “interglacial” periods, sea levels would have been similar to today. The climate at times grew very warm, meaning that Britain was tropical and could support elephants and hippos, the bones of either may be found amongst dredged loads. Mammoths prefer colder climates as so would have migrated during these periods.

The end of the last glacial period began around 12,000 years ago. By 10,000 years ago, many areas, where people once lived, became submerged for the last time. Sea levels continued to rise after this.



Stone hand axes found through dredging and dating to the Middle Palaeolithic (Early Stone Age)



Mammoth

Discoveries of prehistoric material, including stone tools, identify locations where people once lived, which are now submerged under the sea. This evidence is often buried under seafloor sediments, and therefore difficult to find. In the past discoveries of mammoth teeth dating from the Wolstonian glaciation (380,000 to 130,000 years ago) to the end of the Devensian glaciation (c. 10,000 years ago) have been discovered off the coast of the United Kingdom. The Protocol has also had reports of prehistoric tools and mammoth bones found together, notably Licence Area 240 on the East Coast.

Isolated finds like this discovery are useful as they are reminders to remain diligent in these areas for further finds. While animals’ bones have been found in the Owers dredging region, there have been no significant reports of evidence relating to prehistoric activity in this dredging region or Licence Area. Further dredging in Licence Area 122/1A may lead to more discoveries, which could identify the location of a submerged prehistoric landscape. This can help us build up a picture of the past.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The National Monuments Record
- The Historic Environment Record for West Sussex
- The Local Government Archaeology Officer for West Sussex
- The London Finds Liaison Officer (Portable Antiquities Scheme)



Tarmac_0361: Bar Shot

Paul Scrace discovered this bar shot at Greenwich Wharf. It was dredged on 13th of May 2011 by *City of London* from Licence Area 430, in the East Coast region.

This find is a bar shot. It consists of two cannonballs, diameter 4 inches, adjoined by a piece of steel, 12.5 inches in length.

A barshot was an offensive military weapon used to disable an enemy's wooden sail ship by causing damage to the mast or rigging. While non-military ships, for example merchant vessels, often have cannons on board for protection, this weapon was unlikely to be used for defence. When fired from a cannon the bar shot would spin on its trajectory however, it is not very accurate so needed to be fired at close range to hit its target. It stopped being used when armoured steam ships replaced wooden sailing ships.

This discovery was made in Licence Area 430, where there were a significant number of cannonball discoveries during the 2006 – 2007 and 2007 – 2008 Protocol reporting years.

This cannonball would have been fired from a larger type of Saker. The Saker family of guns existed in many different sizes but usually had a bore of between 3½ and 4 inches. Sakers were used from the 16th century. In 1670s Samuel Pepys began a series of reforms of Charles II's navy including the standardisation of the ships. In general terms, and this applied to all classes of gun, those made for the later standardised government contract had to be made within certain precise dimensions. It is very difficult to be precise about positively and conclusively identifying cast-iron round shot, remembering also that the objects will suffer quite considerable weight loss and shape during the underwater corrosion process. The original projectile weight would be between 4 and 6 pounds.

It is unusual that the bar shot would still be in one piece, because of its use, it usually would break up on impact. Another recently reported find may also possible barshot (photograph left), which as you can see in the photograph is no longer intact. This could mean that the barshot was not used, and that it therefore indicates a shipwreck location or ended up in the sea accidentally. However, the photographs do show a large amount of damage to one side of the bar shot (photograph right) and this could mean it was shot but stayed intact.



Possibly broken bar shot



Tarmac_0361 showing damage to cannonballs

This is the first cannonball discovery in this Licence Area for some time. However, in 2006 and 2007 a large number of cannonballs were found in both Licence Areas 340 and 296 in the East Coast dredging region. These cannonballs ranged in size, including the size of the bar shot. This is the first bar shot discovered in the East Coast dredging region.

It is possible that this find along with all of the Licence Area 340 and 296 cannonballs derived from the Anglo-Dutch wars of the mid 17th century. This is supported by the fact that this weapon was probably military, rather than belonging to a merchant ship, and it is unlikely that this type of weapon would be shot during training.

The Anglo-Dutch Wars are an extremely important part of England's history. Not only are they significant as events in the history of naval warfare, but also as struggles for commerce rather than territory, they played a significant role in determining the development and control of trade routes across the sea, particularly to the Far East and North America. These great battles were based entirely at sea and as such had a profound impact in shaping the development of the English Royal Navy.

Two major battles of the Anglo-Dutch Wars are thought to have taken place in this vicinity. The Battle of Lowestoft 1665 was the first engagement of the Second Anglo-Dutch War 1665-7 whereas the Battle of Sole Bay 1672 was the first engagement of the Third Anglo-Dutch War 1672-4.

Wessex Archaeology use GIS to record the location of the cannonball finds and overlay this with historical information regarding these battles. This suggested that Licence Area 340 is in the area thought to be covered by the Battle of Sole Bay, where the Dutch suffered large losses, but no shipwrecks have as yet been recovered.

As a result, it is of the utmost importance that any future finds of archaeological interest discovered in this dredging region are reported through the Protocol immediately. Further finds have the potential to pinpoint the location of a previously unknown shipwreck relating to one of these naval battles, and wharf and vessel staffs are encouraged to keep an eye out for any finds that may relate to the vessels deployed in this significant historical episode.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Suffolk
- The Local Government Archaeology Officer Suffolk
- The London Finds Liaison Officer (Portable Antiquities Scheme)



Tarmac_0362: Aircraft Undercarriage Locking Pin

Paul Scrace discovered this aircraft undercarriage locking mechanism at Greenwich Wharf. It was dredged on 3rd of May 2011 by *City of Westminster* from Licence Area 122/1A, off the South Coast near Bognor Regis.

Wessex Archaeology's initial assessment of this find was that it related to an aircraft. The photographs were sent to the Royal Air Force (RAF) Museum and Tim Wallis, Manager of Conservation at the museum's Micheal Beetham Conservation Centre (MBCC), identified the artefact as part of the locking mechanism for the undercarriage of an aircraft.

Tim suggests that this is part of the locking system for the landing gear of a World War II fighter. The lower shaft of the locking pin has a shaped portion that held a gearing ring; this was rotated when the pilot selected 'Gear up' or 'Gear down'. The undercarriage leg had a block, which ran up the sloping section. This was sprung loaded and the block 'dropped' over the tip, locking the block against the high side and holding the leg in position; when it needed to be released, the mechanism was rotated 180 degrees by the selection lever and the mechanism released the leg.



The AID stamp on the locking pin is for Kennington-Shanks Engineering Co of Waybridge, Surrey

The MBCC is one of the world's centres of excellence for aircraft conservation. One of the plane's in their care is a Spitfire Mk XIX, which was used as a reconnaissance plane towards the end of World War II and into the 1950s. While the locking pin is slightly smaller and has holes in it, Tim noted that the artefact looks almost identical to the same piece of machinery in their Spitfire Mk XIX. In addition the STBD mark is similar but not identical to the one on their Spitfire. It is probable that this plane is a Spitfire of some sort, quite possibly an earlier model.



AID Stamp



STBD Mark

The Supermarine Spitfire is a British single-seat fighter aircraft used by the Royal Air Force and many other Allied countries throughout the Second World War. It was one of the most common British aircraft during World War.

The Spitfire Mk XIX, at the MBCC, is an interesting example because rather than being used as a fighter plane, like the majority of Spitfires, it was used for reconnaissance. It entered service in May 1944 and was last used in 1954 during the Cold War. Due to its suitability for flying in cold environments three planes continued to be used for meteorological research until 1957

It was the only Griffon powered reconnaissance Spitfire. It was produced by taking the Mk XIV fuselage, adding the PR Mk XI wings and PR Mk X cabin.



It could carry 254 gallons of fuel internally, including in the wings, which allowed it to go on distance reconnaissance missions. It could also carry a drop tank. It had top speeds of 445 mph and a service ceiling of over 42,000 feet, putting it out of the range of the Luftwaffe, and making it an excellent spy plane. It carried vertical and oblique cameras for taking photographs of the enemy.

This mechanism may have come from a later reconnaissance Spitfire or an earlier Spitfire. It is interesting that the artefact was discovered in an area which saw intense activity during the Battle of Britain in 1940. The date, type and role of this plane during World War II can only be confirmed through the discovery of more finds. It is important that any aircraft finds discovered from this area are reported through the Protocol immediately, as they may identify the location of an aircraft wreck, which will be protected under the Protection of Military Remains Act (1986).

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- Ministry of Defence
- The National Monuments Record
- The Historic Environment Record for West Sussex
- The Local Government Archaeology Officer for West Sussex
- The London Finds Liaison Officer (Portable Antiquities Scheme)



Tarmac_0366: Fragment of Spitfire Fuselage

Paul Scrace discovered this fragment of a Supermarine Spitfire's fuselage at Greenwich wharf. It was discovered from material dredged by the *City of Westminster* on the 19th of June 2011. It is unclear what Licence Area the material was dredged from as it was a blend of several cargoes.

Wessex Archaeology's initial assessment of this find was that it related to an aircraft. The photographs were sent to the Royal Air Force (RAF) Museum. Ewan Cameron and Dave Carr both identified the artefact as part of a Supermarine Spitfire.

They were able to identify the aircraft from the serial number on the bolt.

Part NO. 30027623, Bolt, Plane Attachment Rear, Supermarine Spitfire.

This means that this attachment connected the tail wing to the fuselage of the plane. The RAF experts noted that you could see fragments of the fuselage still attached.

The Supermarine Spitfire is a British single-seat fighter aircraft used by the Royal Air Force and many other Allied countries throughout the Second World War. It was one of the most common British aircraft during the World War.

The find was discovered in a blend of several cargoes from different Licence Areas. It is thought that it is probably from Licence Area 296, off the Norfolk Coast in the East Coast dredging region. However, we cannot confirm this.

There have been no major aircraft discoveries in Licence Area 296 previously. However, there has been several aircraft fragments reported for the East Coast dredging region. On most occasions the type of plane has been unidentifiable, which makes this find interesting, as we know it is from a Spitfire.



Supermarine Spitfire F Mk XII of 41 Squadron
From Wikicommons



An isolated find such as this artefact is unlikely to indicate an aircraft wreck. As the illustration shows, when an aircraft ditches it can break up over some distance spreading the wreck across the seafloor. The experts at the RAF Museum commented that this fragment indicates that this was a significantly bad crash landing. It is important that any further aircraft remains are reported as it could identify the location of a previously unknown wreck site.

Crashed aircraft are particularly important to archaeologists. Not only do they offer a unique form of evidence for the historical development of flight, but they also often relate to the profound changes in warfare which marked the 20th Century. Moreover, all crashed military aircraft are protected by law under the Protection of Military Remains Act 1986. The discovery of aircraft remains is thus incredibly important, particularly as aircraft crash sites may contain human remains.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- Ministry of Defence
- The National Monuments Record
- The London Finds Liaison Officer (Portable Antiquities Scheme)



Tarmac_0369: Spoon & Fork

N. C. Sait discovered this cutlery at Burnley Wharf in August 2011. It was dredged by the *City of Chichester* from Licence Area 122/3, which lies off the east coast of the Isle of Wight.

Lorraine Mepham, finds specialist at Wessex Archaeology looked at photographs of these finds. Both the spoon and fork are modern in date and the pattern is one of the most common from the 18th century to the present day.

The fork has SHEFFIELD FLATWARE LTD engraved on the reverse side (see right top). Flatware refers to spoons and forks, whilst knives are cutlery. 'Sheffield Flatware' is a common name on cutlery. Sheffield was the main area, outside of London, for the production of cutlery from 1600 and still produces cutlery today.

On the back of the spoon is engraved GLADWIN LTD NS (see right bottom). This refers to Gladwins of Sheffield who produced cutlery during the 20th century. Their hallmarks appear between 1923 and 1951. The NS likely stands for Nickel Silver, which was often the base for silver-plated cutlery.



The cutlery may have been lost overboard or could perhaps be part of the assemblage from a shipwreck. If other material are found in a similar area then it could provide further evidence. However there is another theory why these artefacts were deposited on the seafloor.

Several reports from Licence Area 122/3 have contained finds of a domestic nature. These include a brick (UMA_0114); a metal lock (UMA_0240); countersunk screws, door handles and doorbells (UMA_0241). It has been suggested these domestic items were discarded World War Two rubble. There are no official records to confirm this however the evidence from Protocol finds supports this theory. The spoon and fork may be part of this domestic assemblage.

The exact nature of the debris is not fully understood so it is important to continue to report finds to better understand this unusual Licence Area assemblage.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Hampshire
- The Local Government Archaeology Officer for Hampshire



Tarmac_0371: Modern Spoon

This find was discovered at Tarmac's Burnley Wharf in Hampshire by N. C. Sait. It was dredged from Licence Area 122/3 which lies approximately 13km east of Sandown on the Isle of Wight.

Cargoes of aggregate from Licence Area 122/3 in Hampshire have long been known to contain a wealth of interesting and diverse finds, many of which date to the 20th century. We believe that this area contains a dump of material dating to the 1950's or 1960's which is thought to represent the disposal of post-war rubble.

This spoon, dated 1961, may have been deposited as part of this spread or it might have reached the seabed due to shipping activity in the area. The stamp on the back – which reads 1961 MS Ltd 51883 – not only dates the find but might give information about who produced it. Lorraine Mephram, finds expert for Wessex Archaeology, found one possible manufacturer - Metal Stampings Ltd. based in Pictou, Nova Scotia, Canada - but was keen to highlight that there were likely to be British manufacturers using the same initials.

The style of the spoon is very common for the period in which it was made and the decoration at the end of the handle will be familiar to many people. It is likely to have been made of stainless steel, similar to thousands of items of cutlery manufactured in the late 20th century.

Whilst all of the evidence received from those working in this area points to the presence of a spread of late 20th century material to the east of the Isle of Wight, no records survive to support this. It is therefore very important that industry staff continue to keep up their excellent work reporting finds through the Protocol, as they have been doing for the past 6 years.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Isle of Wight
- The Local Government Archaeology Officer for Isle of Wight
- The Finds Liaison Officer (Portable Antiquities Scheme) for Hampshire



Tarmac_0372: Rudder

This find was discovered at Tarmac's Burnley Wharf in Hampshire by N. C. Sait. It was dredged from Licence Area 122/3 which lies approximately 13km east of Sandown on the Isle of Wight.

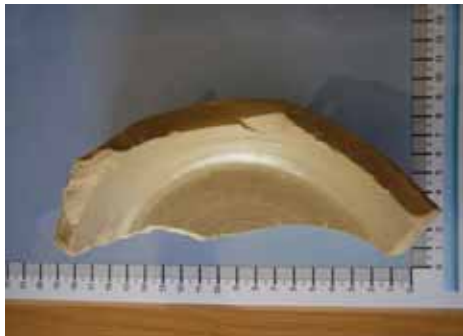
This find appears to be a wooden rudder with copper fastenings. This type of rudder is known as a pintle-and-gudgeon rudder and would likely have been stern mounted on a wooden vessel. The copper 'prong' seen clearly in the image above is the 'pintle' and it would have been inserted through a 'gudgeon' on the stern of the vessel. This is a slightly unusual example, says Stuart Churchley of Wessex Archaeology's Coastal and marine team, as the bracket securing the pintle is inserted through the timber – they are more commonly found secured to the outer surface of the timber. This find appears from the images to have been made by securing several thicknesses of timber together using copper fastenings to create a sturdy rudder. Copper is commonly used for boats and ships as it doesn't rust in the way that iron would in salty seawater.

This rudder appears to have been submerged for some time and has clearly been damaged during its time underwater. As such it is hard to gauge how big it was when it was made but Stuart estimates, based on the size of the pintle, that a vessel with a keel measuring between 8 and 15m long might be a likely source.

Whilst cargoes of aggregate from Licence Area 122/3 in Hampshire have long been known to contain a wealth of interesting and diverse finds, many of which date to the 20th century, it is more likely that this item has come from a small vessel, the wreck of which may still lie within the Licence Area. As it is highly probable that further evidence of this vessel is present in Area 122/3, all further finds should continue to be reported in the hope that they help us to better understand the nature of the archaeological remains.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Isle of Wight
- The Local Government Archaeology Officer for Isle of Wight
- The Finds Liaison Officer (Portable Antiquities Scheme) for Hampshire



Tarmac_0373: Pottery and Ammonite Fossil

These finds were discovered by N. C. Sait at Burnley Wharf, Southampton in August 2011. They were found amongst material dredged from Licence Area 122/3 which lies approximately 13km east of Sandown on the Isle of Wight.

These two finds were dredged from an area well known for containing a diverse range of archaeological finds. Images of the pottery were sent to Lorraine Mephram, Wessex Archaeology's Finds Specialist, and she identified it as being the base of a modern stoneware vessel. Stoneware is a very resilient pottery and is used for homeware, decorative items and cooking vessels, as well as in laboratories. This example appears to be relatively modern and is likely to date to the 19th or 20th centuries. The flat base, straight sides and 15cm diameter of the vessel suggest that it was a jar for holding liquids (stoneware jars were commonly used to transport beer) however it is impossible to confirm this without the rest of the vessel.

The stoneware may have been deposited in this area as part of a spread of post-war rubble thought to have been dumped to the east of the Isle of Wight. Alternatively it might have come from a vessel – either a shipwreck or lost overboard – and further finds from this area could reveal more detail about the seabed in area 122/3.

The older of the two finds, the fossil, bears the imprint of an ammonite – an extinct spiral-shaped sea creature. Ammonites existed from around 240 – 65 million years ago and became extinct at the same time as the dinosaurs. As such this find does not constitute true archaeology, as archaeology only studies the human past and these creatures died a long time before the first human species evolved. It is still important that fossils are reported as some may have been adapted as ornamental items in the past, much as they are today.



Both finds add to our understanding of this intriguing area and the diverse range of archaeological finds it contains.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- Ministry of Defence
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Isle of Wight
- The Local Government Archaeology Officer for Isle of Wight
- The Finds Liaison Officer (Portable Antiquities Scheme) for Hampshire



Tarmac_0374: Refractory or Firebricks

These finds were discovered by N. C. Sait at Tarmac's Burnley Wharf in Hampshire. They were dredged on 10th August 2011 and were amongst a cargo from Licence Area 122/3 which lies approximately 13km east of Sandown on the Isle of Wight.

These bricks are refractory or firebricks made to withstand intense heats in boilers, kilns, chimneys and furnaces. All three bear the name of their makers, the clearest being 'Glenboig' who manufactured the brick on the left in the image above.

The Glenboig factory takes its name from a village in Lanarkshire, Scotland, where the factory was founded. Lanarkshire is well known for providing fireclay suitable for making refractory bricks and bricks from this region are regarded as some of the best in the world. Whilst firebricks were made in Glenboig from the 1830's, these examples are likely to be more recent and probably date to the middle of last century. The Glenboig factory finally closed around 1980 after over 100 years producing firebricks. Lanarkshire is rich in clay deposits ideal for manufacturing this type of brick and is still home to firebrick factories today, though the industry is a shadow of its former self.

Whilst the markings on the other two bricks cannot be positively identified they are also likely to relate to the names of other firebrick factories based in Scotland. These are not the first firebricks to be reported through the Protocol though they are the most Southerly – the other example having been dredged from the Humber region. This is not unusual as Glenboig bricks and others made in Lanarkshire are of such fine quality that they were exported as far afield as Barbados, Russia and South America.

These examples have either come from a ship – either as part of the boiler or as cargo – or are likely to have been used in one of the major manufacturing towns on the South Coast and were possibly deposited at sea as part of a spread of post-war rubble well evidenced in this area by other Tarmac finds.

Information about this discovery has been forwarded to:

- English Heritage
- BMAPA
- The Crown Estate
- Ministry of Defence
- The Receiver of Wreck
- The National Monuments Record
- The Historic Environment Record for Isle of Wight
- The Local Government Archaeology Officer for Isle of Wight
- The Finds Liaison Officer (Portable Antiquities Scheme) for Hampshire



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