

British Marine Aggregate Producers Association, Historic England and The Crown Estate

Marine Aggregate Industry Protocol for the Reporting of
Finds of Archaeological Interest

Annual Report to BMAPA 2016-2017
December 2017

Prepared by
Wessex Archaeology



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Protocol background

The Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest (the Protocol) is the last stage of mitigation in a process to ensure the protection of submerged cultural heritage during marine aggregate industry dredging works. Prior to a licence being granted to dredge a particular licence area, an intensive archaeological investigation is undertaken to identify potential submerged heritage. Using geophysical and geotechnical survey, and analysis of available records, archaeologists identify and protect known and suspected sites of interest within aggregate extraction regions. Even after this level of investigation, unidentified sites and stray artefacts may still be found within dredged loads. In response to this, a Protocol was proposed to define a framework through which such material could be reported, investigated and, crucially, protected. The Protocol ensures that any items of potential heritage importance recovered during aggregate dredging, whether encountered on the seabed, on a dredging vessel or at a wharf after a cargo is landed, can be properly assessed. Significant items can be accurately recorded and archived, while in some instances further mitigation or monitoring may be required.

Wessex Archaeology drafted the Protocol in 2005 on behalf of English Heritage (now Historic England) and the British Marine Aggregate Producers Association (BMAPA).

BMAPA member companies have adopted the scheme voluntarily since 2006, though adherence to the Protocol is increasingly becoming a formal condition of consent for new marine licences and licence renewals. The Crown Estate joined BMAPA in 2009 to co-fund the Protocol Implementation Service. When a find is encountered, it is reported through a Site Champion to a Nominated Contact who alerts the Implementation Service, currently operated by Wessex Archaeology.

The Protocol has been overwhelmingly successful, with over 1,700 finds reported since its inception. These range from Palaeolithic handaxes to military aircraft and maritime losses.

The Protocol Implementation Service has now completed its twelfth year of operation and this annual report covers the period from 1 October 2016 to 30 September 2017.

Access

Planning conditions relating to archaeology are placed on developments for the public benefit, which encompasses a duty to publicise results accordingly.

Details of all dredged finds are reported to: Historic England; BMAPA; The Crown Estate; the National Record of the Historic Environment (previously the National Monuments Record); and the appropriate local Historic Environment Record (HER). Where appropriate, finds are also reported to the Receiver of Wreck and the Ministry of Defence.

All finds are also published on the new Marine Aggregate Industry Archaeological Protocol Facebook page¹ that was set up in March 2017 and in the annual report². In addition, the exemplary efforts made by the BMAPA companies with regard to the Protocol are acknowledged through various publications produced by Wessex Archaeology, including the biannual *Dredged Up* newsletter.

The Crown Estate has also made the information and data regarding discoveries reported through the Protocol available online, in WGS 84 lat/long. It can be viewed through a GIS website³.



1. <https://www.facebook.com/marineaggregateindustryarchaeologicalprotocol>

2. <http://www.wessexarch.co.uk/projects/marine/bmapa/reviews>

3. <http://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=99a2073a1b874527865fb06bfde67552>



Reporting process

Archaeological finds identified by wharf and vessel staff are reported through a Site Champion or the Master of the vessel to the designated Nominated Contact, who uploads images and details of the find to the console. In some cases, the Site Champion will report finds directly to the console. This alerts the Protocol Implementation Service operated by Wessex Archaeology.

Wessex Archaeology then communicates directly with the Nominated Contact regarding the archaeological importance of the discovery, and conservation and storage recommendations.

The Nominated Contact for each company is detailed below.

BMAPA Company	Nominated Contacts	Position
Britannia Aggregates Ltd	Richard Fifield	Marine Resources Manager
CEMEX UK Marine Ltd	Samantha Bevan	GIS and Licence Co-ordinator
DEME Building Materials Ltd	Christophe Matton Tom Janssens	Marine Resources Manager General Manager
Hanson Aggregates Marine Ltd	Chris Popplestone	GIS and Resources Co-ordinator
Isle of Wight Aggregates	Edward Skinner	Marine Resources Co-ordinator
Kendall Bros Ltd	Paul Stevens	Managing Director
Tarmac Marine	Edward Skinner	Marine Resources Coordinator
Volker Dredging Ltd	Will Drake	General Manager



Twelve successful years

In 2016–2017, the Protocol celebrated its twelfth successful year. Over a twelve month period, 93 individual finds as diverse as a mammoth tooth and a railway track chair have been reported through the Protocol. These have been added to a database that now totals of over 1,700 finds reported since the launch of the scheme in 2005.

If not for the dedication and enthusiasm of wharf and vessel staff, these finds would probably have never entered the archaeological record. The reporting framework laid out in the Protocol provides a structured way of documenting and reporting finds to the Protocol Implementation Service team at Wessex Archaeology who can identify or research the items before sharing the results with the named authorities and marine aggregate industry staff. In the instance that the team cannot identify the object, further specialists are contacted to ensure that the utmost is done to provide a background on the reported find.

The ongoing success of the Protocol reveals that it is as relevant now as it was in 2005. The support of the marine aggregate industry has once again been consistent and substantial, with the continued reporting of significant archaeological finds maintained at a high standard through the Protocol and the welcome received during wharf visits.

Through the implementation of the Protocol, the marine aggregate industry has demonstrated that this is a cost-effective mitigation option for protecting cultural heritage that is both fragile and finite. The Protocol Awareness Programme empowers staff to recognise and report finds of archaeological interest – a simple yet effective model. Because of this success, the Protocol model has been adapted and implemented for use in several other industries. The Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) is now equally well-established, having commenced in 2010. In addition, 2016 has seen the relaunch of the Fishing Industry Protocol for Archaeological Discoveries (FIPAD), as well as a reinterpretation of the Protocol principles for non-industry audiences, with the launch of the Marine Antiquities Scheme (MAS). In addition, Wessex Archaeology continues to run scheme-specific protocols for other development projects based on the marine aggregate industry model.

With the twelfth year of the Protocol a success, we look forward with anticipation to see whether the high volume of finds becomes a trend during the remainder of the second decade.

Further information about the Protocol and the Protocol Implementation Service is available online
<http://www.wessexarch.co.uk/projects/marine/bmapa/index.html>

To contact the Protocol Implementation Service email protocol@wessexarch.co.uk or phone **01722 326 867**



Raising awareness

The current phase of the Protocol Awareness Programme is funded by BMAPA and The Crown Estate, and implemented alongside the Protocol by Wessex Archaeology. It is important to continually promote awareness of the Protocol, particularly to staff of those wharves and vessels who are engaging with it on a less frequent basis, and to maintain a close relationship with the staff on the ground, who may change over time. During the visits, any queries can be addressed and feedback can be gathered.

The awareness programme:

- delivers in-person training during awareness visits to wharves, aiding industry staff to identify different types of archaeological finds as well as the process of reporting finds of archaeological interest discovered while receiving marine dredged aggregate;
- produces the biannual *Dredged Up* newsletter which aims to publicise the Protocol and highlight recent finds and news. The newsletter is sent out to each Nominated Contact, wharf and vessel that implements the Protocol. The most recent issue, Issue 21 printed in autumn 2017, and all previous *Dredged Up* newsletters, can be found online <http://www.wessexarch.co.uk/projects/marine/bmapa/dredged-up>;
- raises Protocol awareness amongst third parties, such as geotechnical and environmental survey companies working on behalf of the marine aggregate industry; and
- is available to support and train Site Champions to ensure that new and existing staff are familiar with the Protocol.

Visits to wharves

Since the 2015–2016 annual report was published, six Protocol Awareness Visits have been made to wharves around the country. The Protocol Implementation Service team ran training sessions to wharves in Kent, Suffolk, Dorset, Sussex and Hampshire.

The training sessions are informal and are designed to fit in to the working day of a wharf. A member of the Protocol Implementation Service team brings a display of archaeological finds previously reported through the Protocol that wharf staff can handle, as well as awareness documents and laminated scale sheets. These handouts include: an Introduction; Reporting Process; Concretions and Metalwork; Munitions and Ordnance; Prehistoric Finds; Photographing Finds (including a scale sheet); Conservation and Storage; and a Timeline. A short presentation is given and there is a timeslot allocated for any questions or feedback wharf and vessel staff may have with regards to the way the Protocol works. The Protocol Implementation Service team firmly believe that these visits are key to the success of the scheme. As well as delivering the training, the visits allow Wessex Archaeology to maintain contact with wharves and vessels, boost interest in the Protocol and promote it to both new and existing staff. The awareness materials left at the wharves enable the Site Champions to induct new starters into the scheme.

All awareness materials can be accessed through the Protocol pages on Wessex Archaeology's website (<http://www.wessexarch.co.uk/projects/marine/bmapa/docs.html>) and are available in English, Dutch and French.





New awareness materials

In July 2017, new Protocol materials were launched in the form of a training certificate to hand out to wharf and vessel staff who receive awareness training so that they may add them to their portfolios. This was implemented after feedback from the Site Champion at Cliffe Wharf, Kent. These were emailed to each Site Champion after the wharf was visited. In September 2017, a feedback form was also designed to be handed to the wharf or vessel staff during future visits to create an opportunity to provide comments so that we can continue to make improvements to the Protocol and the way we promote it.

Visits have been undertaken this year to British wharves receiving marine aggregate. Contact has been maintained with wharves, vessels and Continental wharves through regular emails, the Facebook page, the annual report and the *Dredged Up* newsletter.

If you would like to arrange a Protocol Awareness Visit, or would like to receive more advice on finds and finds reporting, please contact Wessex Archaeology via protocol@wessexarch.co.uk.



Dredged Up newsletter

In 2016–2017, two issues of the biannual *Dredged Up* newsletter were produced.

Issue 20, Spring 2017, was distributed in May, and highlighted some of the year's finds and showcased new finds and updates from the Marine Antiquities Scheme. In addition, it published the winners of the annual Finds Awards.

Issue 21, Autumn 2017, was distributed in October and shared information on flint finds and wharf news. It also listed the location of the Protocol Awareness Visits that took place in the summer of 2017 and gave those who use the Protocol an opportunity to read about some of the in-house specialists at Wessex Archaeology.

The newsletters are distributed to every wharf, all vessels and BMAPA member companies as well as The Crown Estate, Historic England, Wessex Archaeology and a variety of other organisations, individuals and the general public. A wider audience is reached by uploading a downloadable digital copy of the newsletter onto the Wessex Archaeology website and relevant social media pages.

The newsletters reach a wide audience to promote the operation of the Protocol and provide a positive showcase for the industry's activities. They are also an important tool for raising and maintaining awareness and interest by publicising dredged finds.



Newsletter issues 20 and 21



Burnley Wharf, Southampton

Finds Awards

The 2015–2016 Finds Awards were made to the following wharves and vessel. More details about these Finds Awards are available in Issue 20 of *Dredged Up*.

Tarmac's Burnley Wharf – Best Attitude by a Wharf

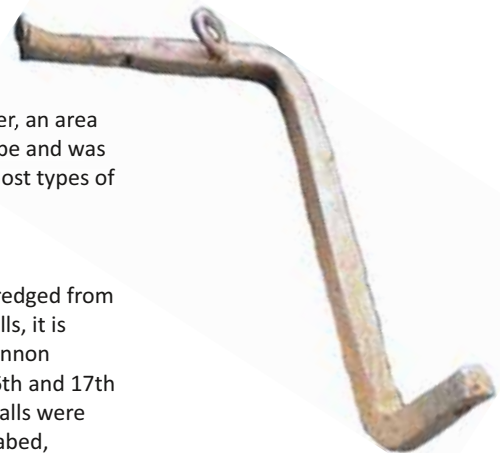
Burnley Wharf reported 49 finds in 2015–2016, almost half of the total number of finds (97) reported for that year. The implementation team would like to thank this particular wharf for the dedication that its staff have to the Protocol and their eagerness to report all finds. Burnley Wharf was visited in the summer of 2017.

Tarmac Marine's City of London – Best Attitude by a Vessel

D. Johnson, crew member of *City of London* spotted a very unusual small lead object (Tarmac_0664) whilst offloading material in April 2016. The object comes from Humber, an area from which very few finds have been reported. It resembles a common bracket in shape and was surmised to have once been part of a larger supporting structure as present aboard most types of vessels, but the lead material it is made of is far too soft to support this theory.

Tarmac's Burnley Wharf – Best Find

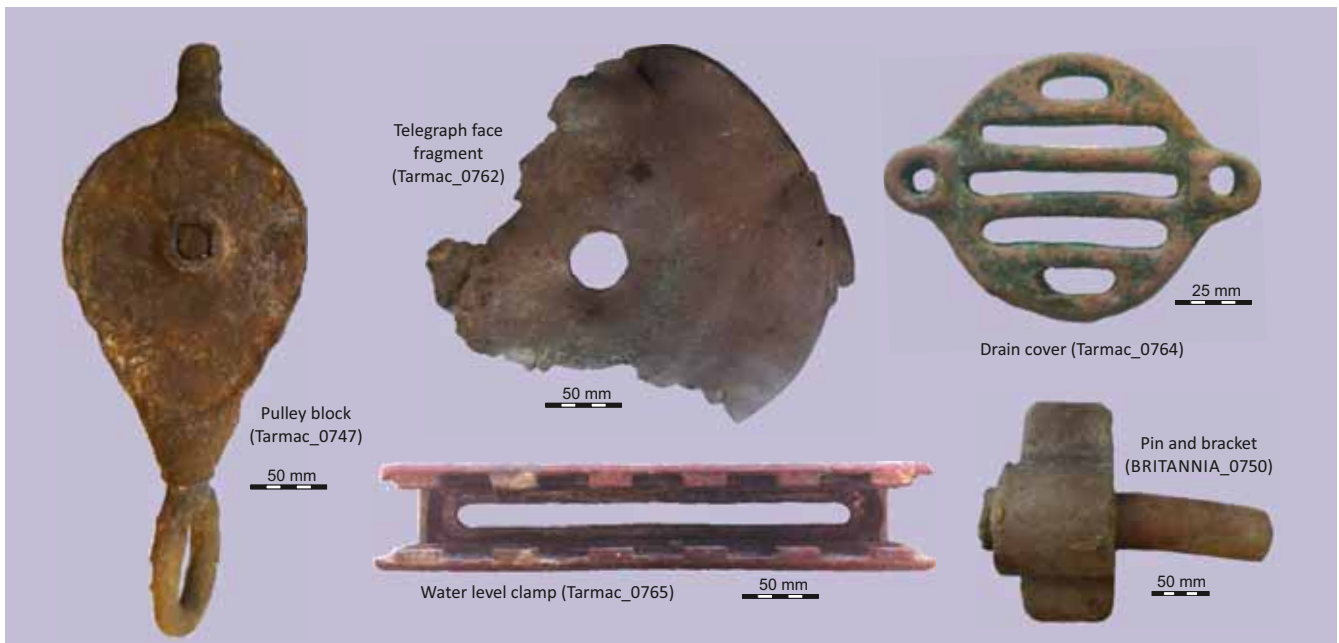
Burnley Wharf discovered a collection of 11 cannonballs (Tarmac_0672a) that were dredged from Licence Area 127 to the east of the Isle of Wight. Judging by the sizes of the cannonballs, it is thought that they may have been of the right size to have been fired from a minion cannon (a French word meaning 'cute'), which were used by both the army and navy in the 16th and 17th centuries. The exciting thing about this discovery is the fact that some of the cannonballs were concreted while others were not, suggesting that they may have been piled on the seabed, possibly representing a cannonball dump site or even an unknown shipwreck.



Tarmac_0664
(scale unknown)



Tarmac_0672a



Protocol reports

During the twelfth year of operation, Wessex Archaeology received 64 reports through the Implementation Service. These reports encompassed details of 93 separate finds. Further details of each discovery are shown below and included in the wharf reports appended to this report.

Finds reported in 2016–2017

Report ID	Licence Area	Region	Wharf/Vessel	Description	No.
CEMEX_0742	137	South Coast	Brighton	Stone cannonball	1
CEMEX_0743	512	East Coast	Northfleet	Aluminium fragment	1
Tarmac_0745	460	East English Channel	Erith	Ship's timber	1
Tarmac_0746	Unknown	Unknown	Greenwich	Cannonball	1
Tarmac_0747	254	East Coast	Greenwich	Metal pulley block	1
Tarmac_0748	460	East English Channel	Greenwich	Unknown metal object	1
Britannia_0749	498	Thames Estuary	West Bank Terminal, Ipswich	Railway track chair	1
Britannia_0750	228	East Coast	Cliffe	Bronze pin and bracket	1
Britannia_0751	228	East Coast	Cliffe	Timber with bronze nail	1
Tarmac_0752	351	South Coast	Marchwood	Metal pin	1
Tarmac_0753	351	South Coast	Marchwood	Brass cap	1
Tarmac_0754	351	South Coast	Marchwood	Driving band fragment	1
Tarmac_0755	Unknown	South Coast	Marchwood	Possible knife	1
Tarmac_0756	Unknown	South Coast	Marchwood	Metal fitting	1
Tarmac_0757	Unknown	South Coast	Marchwood	Metal fitting	1
Tarmac_0758	Unknown	South Coast	Marchwood	Possible engine valve	1
Tarmac_0759	Unknown	South Coast	Marchwood	Semi-circular metal fragment	1
Tarmac_0760	127	South Coast	Southampton	Cannonball	1
Tarmac_0761	127	South Coast	Marchwood	Cannonball	1
Tarmac_0762	351	South Coast	Bedhampton	Fragment of ship's telegraph face	1
Tarmac_0763	351	South Coast	Bedhampton	Ceramic pot or bowl base	1
Tarmac_0764	351	South Coast	Bedhampton	Metal drain cover	1
Tarmac_0765	351	South Coast	Bedhampton	Water level clamp	1
Tarmac_0766	351	South Coast	Bedhampton	Metal screw lid	1
Tarmac_0767	351	South Coast	Bedhampton	Gas regulator	1
Tarmac_0768	351	South Coast	Bedhampton	Bottom of shell casing	1
Kendalls_0769	Unknown	South Coast	Shoreham	Copper plate	1

Continues next page



Finds reported in 2016–2017 continued

Report ID	Licence Area	Region	Wharf/Vessel	Description	No.
CEMEX_0770	512	South Coast	<i>Sand Fulmer</i>	Webbing net with aluminium fittings	1
Tarmac_0771	351	South Coast	<i>City of Chichester</i>	Unknown metal object	1
Tarmac_0773	351	South Coast	Bedhampton	Brush handle	1
Tarmac_0774	351	South Coast	<i>City of Chichester</i>	Metal fuel can	1
Tarmac_0775	351	South Coast	Bedhampton	Metal flange plate	1
Tarmac_0776	395/1	South Coast	Bedhampton	Silver plated spoon	1
Tarmac_0777	395/2	South Coast	Bedhampton	Brass gimbal bracket	1
Tarmac_0779	395/1	South Coast	Shoreham	Brass porthole ring	1
Tarmac_0780	395/1	South Coast	Shoreham	Fuel pipe coupler	1
Tarmac_0782	127	South Coast	Southampton	Brass ring	1
Tarmac_0783	127	South Coast	Southampton	Metal sleeve/guard	1
Tarmac_0784	127	South Coast	Southampton	Cast iron cannonball	1
Tarmac_0785	395/1	South Coast	Bedhampton	Winding handle	1
Tarmac_0786	395/1	South Coast	Bedhampton	Metal spike with nut	1
Tarmac_0787	351	South Coast	Bedhampton	Spanner	1
CEMEX_0788	340	South Coast	<i>Sand Heron</i>	Water pump	1
CEMEX_0789	512	East Coast	Dagenham	Knife blade	1
Tarmac_0790	395/1	South Coast	Bedhampton	Cast iron cannonball	1
BRITANNIA_0791	Unknown	Unknown	Cliffe	Mammoth tooth	1
CEMEX_0792	Unknown	Unknown	Northfleet	Mammoth tooth	1
CEMEX_0794	Unknown	Unknown	Northfleet	Animal bone (mammoth)	1
CEMEX_0795	Unknown	Unknown	Northfleet	Animal bone (mammoth)	1
CEMEX_0796	137	South Coast	Leamouth	Possible pulley wheel	1
BRITANNIA_0797	Unknown	Unknown	West Bank Terminal, Ipswich	Scissors	1
CEMEX_0799	Unknown	Unknown	Northfleet	Watertight door handle	1
CEMEX_0800	Unknown	Unknown	Northfleet	Pair of iron finials	1
CEMEX_0801	137	South Coast	Leamouth	Shell	1
CEMEX_0802	137	South Coast	Leamouth	Shells	2
WARG_0803		South Coast	Survey vessel	Three pieces of metal (porthole)	3
Tarmac_0805	509/2	Thames Estuary	<i>City of London</i>	Cannonball	1
Tarmac_0806	509/2	Thames Estuary	Greenwich	Fossil	1
Tarmac_0807	127	South Coast	Burnley Southampton	5 cannonballs	5
Tarmac_0808	127	South Coast	Burnley Southampton	15 cannonballs	15
Tarmac_0809	127	South Coast	Burnley Southampton	Ship's nail	1
Tarmac_0810	351	South Coast	Burnley Southampton	Waterlogged wood	4
Tarmac_0811	127	South Coast	Burnley Southampton	6 cannonballs	6
Tarmac_0812	351	South Coast	Shoreham	Brass plate with CM initials	1



Specialists

If finds cannot be successfully identified by a member of the Protocol Implementation Service team at Wessex Archaeology, experts both in-house and from external companies and organisations are consulted. Since the implementation of the Protocol in 2005, the collection of willing and valuable experts we consult has grown to include a range of fields. Occasionally, the experts are consulted to add any additional information about objects, or in order to ensure that discoveries are identified accurately and the archaeological value of each object is understood. The table below provides a list of the specialists who gave advice during the 2016–2017 reporting year. Specialists that we have contacted in the past but not during this operational year are still included in Wessex Archaeology's internal lists, but have been omitted from the table below. We are extremely grateful to all the specialists who have assisted in the identification of Protocol finds over the last twelve years.

Expert	Advice given concerning	Institution/Organisation
Dan Atkinson	Maritime artefacts	Wessex Archaeology
Ewen Cameron	Military aircraft	RAF Museum
Bob Davis	Archaeological artefacts	Wessex Archaeology
Toby Gane	Maritime artefacts	Wessex Archaeology
Lorraine Higbee	Zooarchaeology	Wessex Archaeology
Dr Adrian Lister	Mammoth remains	Natural History Museum
Phil Magrath	Ordnance	Royal Armouries Museum
Anthony Mansfield	Mechanics and engineering	Senior Naval Engineer
Lorraine Mepham	Pottery	Wessex Archaeology
Trevor Parker	Ordnance	Ordnance Society
Steve Vizard	Aircraft	Airframe Assemblies



Case Study 1 – Prehistoric Mammals

Large mammal remains in the form of mammoth bones and teeth have been reported through the Protocol since its inception with a total of 95 individual finds being recorded since 2005. This year, four examples of prehistoric mammal remains reported through the Protocol have been dated to the Palaeolithic era. Two of these examples were identified as teeth while the other two pieces were fragments of robust animal bone.

Britannia_0791 is a whole mammoth tooth discovered at Cliffe Wharf in Kent and handed to a member of the Protocol Implementation Service team during a wharf visit in June this year. The tooth measures 160 mm by 140 mm and had split in two whilst at the wharf. Images of the find were sent to Dr Adrian Lister at the Natural History Museum for further identification. It was concluded that this particular tooth is a complete left lower first molar of an adolescent woolly mammoth. *Mammuthus primigenius* or woolly mammoth were in existence in Europe during the Middle and Late Pleistocene, dating from 350,000 to 10,000 years ago (Lister and Sher 2001). European mammoths have conventionally been divided into three species: the Early Pleistocene *Mammuthus meridionalis* (2.6 to 0.7 million years ago), the early Middle Pleistocene *Mammuthus trogontherii* (0.7 to 0.5 million years ago), and the woolly mammoth, *Mammuthus primigenius* (Lister and Sher 2001) which disappeared from Britain around 14,000 years ago (<http://news.bbc.co.uk/1/hi/sci/tech/8106090.stm> accessed 12/07/17). Important changes can be seen in the teeth of the mammoths as each species evolved; there was an increase in the number of enamel bands (plates) in the molars, and thinning of the enamel. The dental changes resulted in increased resistance to abrasion, which is believed to indicate a shift from woodland browsing to grazing in open grassy habitats of the Pleistocene.

The second and smaller tooth, CEMEX_0792, measuring 140 mm by 80 mm, was discovered at Northfleet Wharf in Kent. Based on the images, Dr Adrian Lister from the Natural History Museum concluded that this example was a small part of an upper molar (probably second or third) of a mammoth or ancient elephant species. Despite a large quantity of high quality images, the occlusal surface of the tooth that is needed to judge the species was not visible on this specimen, so this remains unknown. The poor quality of the occlusal surface could be due abrasion of the find while on the seabed.

CEMEX_0794 and CEMEX_0795 are both fragments of large fossilized or mineralised animal bone that were both handed to a member of the Protocol Implementation Service team at Northfleet Wharf in Kent. It is not possible to determine whether the finds are associated with each other. Mineralisation occurs when bones have been in the ground for a long period of time and mineral-laden waters have percolated through the porous material, saturating it with mineral deposits. It is then petrified and will become much heavier and robust than it originally was, almost taking on the appearance and characteristic of stone. The quicker the process of petrification, the better chance the bone has of surviving. Both fragments were examined by Lorrain Higbee, a zooarchaeologist at Wessex Archaeology.



Smaller tooth of a mammoth or ancient elephant (CEMEX_0792)



Animal bone fragment (CEMEX_0795)



Animal bone fragment (CEMEX_0794)

CEMEX_0794, a rounded fragment of bone measuring 230 mm by 170 mm, is possibly the centre point of a mammoth jaw where both halves meet. Due to the bone being fragmented, it was not possible to determine what species of mammoth the bone derived from. CEMEX_0795, measuring 240 mm by 120 mm, was determined most likely to be a fragment of a limb bone shaft of a large mammal, possibly a tibia belonging to a species of mammoth or woolly rhinoceros. Woolly rhinoceros, or *Coelodonta antiquitatis*, was a large animal exceeding 2 tonnes, adapted to feeding on low-growing herbaceous vegetation, and to a dry climate with minimal snowfall. The large bulk of the body and the short legs, lacking spreading hooves or pads, indicate an animal unable to travel well in deep snow. The woolly rhinoceros has been widely regarded as having been a ‘fellow traveller’ of the woolly mammoth, *Mammuthus primigenius*, as their remains commonly occur together in deposits. Woolly rhinoceros disappeared from Britain around 35,000 years ago. The final extinction of the woolly rhinoceros around 13,900 years ago probably relates to a period of warming and increased precipitation (especially snowfall) accompanied by the replacement of low-growing herbaceous vegetation by shrubs and trees during the Late Glacial.

The remains of mammoths or elephant species may end up in marine contexts after being washed down from terrestrial deposits by rivers or eroded from cliffs or beaches. Alternatively, they may date to a time when the seabed was dry land. During the last 2.5 million years, known as the Pleistocene on the geological timescale, there have been numerous cold glacials (ice ages), separated by warmer interglacials. During colder periods large continental ice sheets covered much of Britain and most of the north-west European peninsula (<http://ets.wessexarch.co.uk/recs/humber/archaeology/> accessed 12/07/17). 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 accessible to humans and animals. A collection of stone tools and animal remains found together could indicate a prehistoric site that was utilized when the seabed was dry land. Unlike shipwrecks or aircraft remains, submerged prehistoric sites 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 prehistoric date that are reported through the Protocol, the more our understanding of these areas can be enhanced in order to reconstruct submerged prehistoric landscapes.

References

- Lister, A. M. and Sher, A. V., 2001. The Origin and Evolution of the Woolly Mammoth. *Science* (volume 294).
 McNamara, K. and Murray, P., 2010. *Prehistoric Mammals*. Western Australian Museum.
 Stuart, A. J. and Lister, A. M., 2012. Extinction chronology of the woolly rhinoceros *Coelodonta antiquitatis* in the context of late Quaternary megafaunal extinctions in northern Eurasia. *Quaternary Science Reviews* (volume 51).



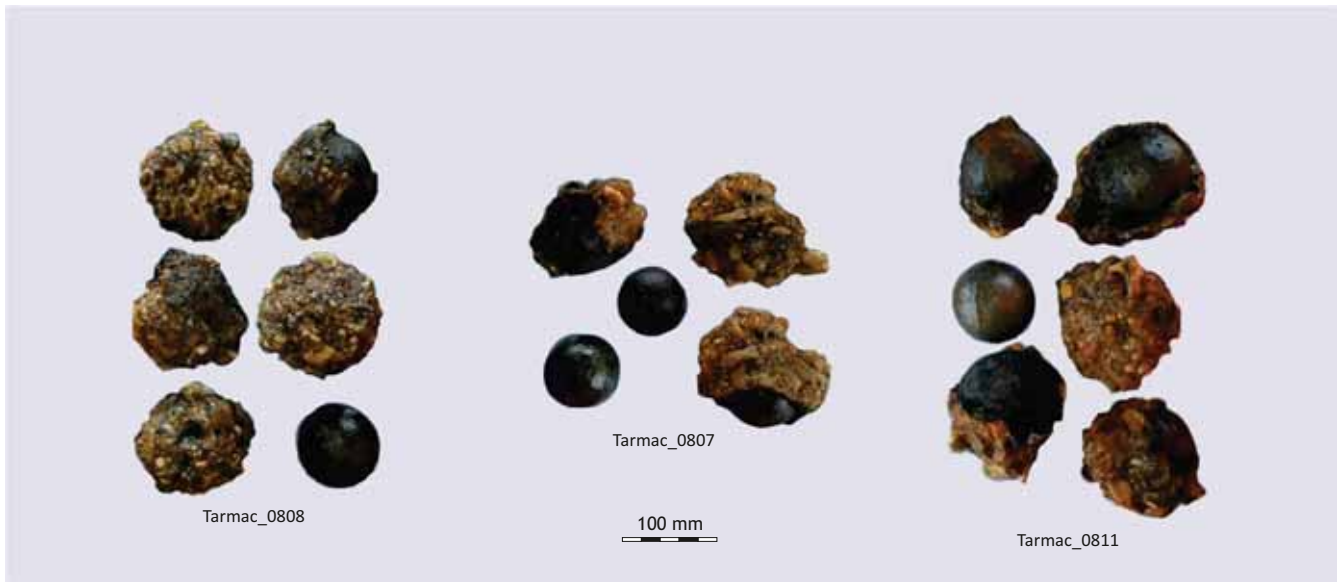
Case Study 2: Cannonballs and Cannons

Cannonballs make up a large number of the finds reported through the Protocol since 2005, with a total of 85 reported up until October 2016. The reporting year of 2016–2017 was no exception with a total of 33 cannonballs, representing over a third of the 93 finds reported; 32 are made of cast iron and one of stone. From the diameter of an iron cannonball, it is possible to try to determine the cannon they were fired from, which may help in dating the find.

CEMEX_0742, the only stone cannonball reported this year, was dredged from Licence Area 137 and has a diameter of 180 mm. Stone cannonballs were commonly used during the medieval period in addition to iron or lead examples. They were widely used throughout the 15th and 16th centuries, until preference changed to iron shots in the 1630s as the cost of manufacturing was reduced (Caruana 1994, 189). The type of stone used is unclear without lithological identification. British examples were commonly made from a hard form of limestone known as Kentish Ragstone, one of the few hard stones found in southern England. The cannonball is particularly large at 7 inches (180 mm) in diameter, which equates to roughly a 42–48-pounder cannon; a 48-pounder is the size of the largest French gun during the reign of Louis XIV (1643–1715). As a general rule, stone shot was commonly used with chambered guns.

Some of the cannonballs received are an unusual size, appearing to predate the standardisation of ordnance that occurred in the early 18th century in England. Tarmac_0760 and Tarmac_0761, which were dredged from Licence Area 127, are good examples of this, with both measuring $3\frac{1}{2}$ inches (89 mm) in diameter. Both are cast iron and one was heavily concreted, although they are not believed to be connected. The closest weapon that would match a shot of this size is listed by Carpenter (1993) as a saker or saker drake. These were a medium-sized muzzle-loaded cannon developed during the 16th century, and used heavily by the English navy, particularly during Henry VIII's expansion of the navy. They had a bore diameter of between $3\frac{1}{2}$ and 4 inches (89–102 mm) and fired a round shot of $3\frac{3}{4}$ – $3\frac{1}{2}$ inches diameter (82–95 cm), weighing between $4\frac{1}{4}$ and $7\frac{1}{2}$ lb (2.15–3.4 kg). There were also breech-loading swivel guns that fired a similar sized shot of either stone or cast iron and were known under a variety of names, covering a number of variations in design and calibre; these included Sling, Base, Portingale and Murder, from before the Tudor period through to the 18th century. These same names, however, applied to a variety of different calibres and sized weapons. Slings for example varied in size from between $2\frac{1}{4}$ and $4\frac{1}{2}$ inches (57–114 mm) in calibre (Smith 1995).

Another cannon that is represented by the finds reported through the Protocol this year is a culverin; a smooth-bored brass gun with a long barrel used to bombard targets from a distance (Garrett 2010). Culverin was a class that included a range of different guns; however, the culverin itself was the largest of this class (Childs 2009) and fired shots ranging from $4\frac{3}{4}$ up to $5\frac{1}{2}$ inches (121–140 mm) (Museum of Artillery). The Culverin weighed around 4,500 lb, and the shots fired from it would typically be between 17.5 and 18 lb (7.9–8.2 kg) (Garrett 2010). These guns were used by the French in the 15th century, and later adapted for naval use by the English in Henry VIII's navy in 1546 (Childs 2009). Eighteen-pounders are a standardised version of the same cannon with a change of name following the standardization of artillery sizes by the British Board of Ordnance in 1716. Rather than refer to them by the various names that the different cannon variations had possessed up to this time, they were standardized to the weight of round ball that they fired, rounded up to the nearest pound of the commonest weights (Carpenter 1993). The three cannonballs thought to have been fired from this type of gun are Tarmac_0784, Tarmac_0790 and Tarmac_0805. Tarmac_0784 is a cast iron cannonball with a diameter of $5\frac{1}{2}$ inches (140 mm) that was dredged from Licence Area 127 and has been subjected to heavy corrosion in the marine environment. Tarmac_0790, on the other hand, was dredged from Licence Area 395/1 and is also a cast iron cannonball with a smaller diameter of 5 inches (130 mm). The smallest of the three, Tarmac_0805, is a cast iron cannonball with a diameter of 4.7 inches (120 mm). This particular find was dredged from Licence Area 509/2 and has heavily degraded in the marine environment resulting in a loss of shape.



A minion (the French word for ‘cute’) is a type of cannon. Carpenter’s 1993 list of Tudor Ordnance describes them as smooth-bore muzzle loaders, made of brass or iron, with a 3 inch calibre, firing a 2¾ inch cannonball, weighing 800 lb, 7 foot in length, and with a maximum range of 1200 paces, with a point blank range of 120 paces (Carpenter 1993). This small cannon was used from the Tudor period up until the 17th century, so dating the cannonball itself is difficult. The minion features heavily in the Elizabethan navy and is associated famously with the vessel *Context*, that managed to keep three ships and two galleons at bay using only one minion, one saker and one falcon in 1591 (Childs 2009). This type of cannon was also used in the English Civil War (1642–1651) where it is recorded as having a weight of 1200 lb (Bull 2008). Eight minions also made up the armament of the famous ship, *Mayflower*, that carried pilgrims from Plymouth to the New World in 1620 (Bradford 1952). Although the licence area that Tarmac_0746 is dredged from is not known, the cast iron cannonball weighs just under 2.5 lb (1.1 kg) and measures 2¾ inches (70 mm) in diameter, and is believed to have been fired from a minion cannon. Three further separate reports consisting of a total of 26 cannonballs, all dredged from Licence Area 127 are also believed to have belonged to minion cannons, although whether they are all related is unclear. The cannonballs display a varying level of concretion, with some completely covered whilst others still display the raised line along their circumference where they were originally cast (Groover 2010). Tarmac_0807 is a collection of five cast iron cannonballs; Tarmac_0808 a collection of 15 cast iron cannonballs; and Tarmac_0811 is a collection of six cast iron cannonballs; all 26 cannonballs were described as having an approximate diameter of 3 inches.

As shown by this case study, cannonballs are common finds around the south coast of England. This is to be expected for an area with a long naval history. Documented military training and naval battles have taken place along this stretch of coastline for hundreds of years, and other nations would have used the English Channel during military actions, trade and transport. This is not to say that all cannonballs reported through the Protocol would have been fired in battles or training exercises. Some may have been lost overboard during everyday shipping operations, or may have belonged to a cargo of a sunken vessel. The study of cannonballs can inform us on the type of cannon they may have belonged to, although it is important to consider that such objects can change in the marine environment. They may have eroded and have lost some of their diameter, or their weight may have altered after spending so long on the seabed, making the assumptions about their matching cannons inaccurate. However, shots usually had a size bracket they fitted in and could still belong to the identified cannon despite any wear that may have occurred.

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Liaison and accessibility

Details of each discovery have been sent to:

Mark Russell	British Marine Aggregate Producers Association
Stuart Churchley	Historic England, Marine Planner
Hefin Meara	Historic England, National Record of the Historic Environment
Nick Everington	The Crown Estate
Mark Wrigley	The Crown Estate
Katrina Oppermann	The Crown Estate

Details of discoveries regarded as wreck under the Merchant Shipping Act 1995 have been forwarded to the Receiver of Wreck, Alison Kentuck. In 2016–2017 the following reports were deemed to represent items of wreck:

<u>Report ID</u>	<u>Droit number</u>	<u>Report ID</u>	<u>Droit number</u>	<u>Report ID</u>	<u>Droit number</u>
CEMEX_0742	331/16	Tarmac_0765	025/17	Tarmac_0790	133/17
CEMEX_0743	346/16	Tarmac_0766	026/17	BRITANNIA_0791	N/A
Tarmac_0745	391/16	Tarmac_0767	027/17	CEMEX_0792	N/A
Tarmac_0746	392/16	Tarmac_0768	028/17	CEMEX_0794	N/A
Tarmac_0747	393/16	Kendalls_0769		CEMEX_0795	N/A
Tarmac_0748	394/16	Cemex_0770	052/17	CEMEX_0796	209/17
Britannia_0749	009/17	Tarmac_0771	050/17	BRITANNIA_0797	217/17
Britannia_0750	010/17	Tarmac_0773	049/17	CEMEX_0799	210/17
Britannia_0751	011/17	Tarmac_0774	048/17	CEMEX_0800	211/17
Tarmac_0752	012/17	Tarmac_0775	047/17	CEMEX_0801	212/17
Tarmac_0753	013/17	Tarmac_0776	046/17	CEMEX_0802	226/17
Tarmac_0754	014/17	Tarmac_0777	051/17	WARG_0803	227/17
Tarmac_0755	015/17	Tarmac_0779	059/17	Tarmac_0805	251/17
Tarmac_0756	016/17	Tarmac_0780	058/17	Tarmac_0806	N/A
Tarmac_0757	017/17	Tarmac_0782	081/17	Tarmac_0807	253/17
Tarmac_0758	018/17	Tarmac_0783	086/17	Tarmac_0808	249/17
Tarmac_0759	019/17	Tarmac_0784	083/17	Tarmac_0809	252/17
Tarmac_0760	020/17	Tarmac_0785	085/17	Tarmac_0810	248/17
Tarmac_0761	021/17	Tarmac_0786	084/17	Tarmac_0811	250/17
Tarmac_0762	022/17	Tarmac_0787	082/17	Tarmac_0812	267/17
Tarmac_0763	023/17	CEMEX_0788	087/17		
Tarmac_0764	024/17	CEMEX_0789	088/17		

In the twelfth year of the Protocol, only one discovery was made relating to aircraft. While it was not connected with the military, the following report was forwarded to Sue Raftree at the Ministry of Defence for her interest: CEMEX_0743.

Although the Protocol received a number of reports of artefacts which may relate to vessels, none of them relates conclusively to unknown and uncharted wreck sites. Consequently, no reports were forwarded to the United Kingdom Hydrographic Office in the 2016–2017 reporting year.

Information on each find has been forwarded to each county HER relevant to the location of the discovery. In the case of a discovery where the original location is known, this will be the HER closest to the licence area. Discoveries made at wharves where the licence area is unknown are reported to the HER nearest to the wharf.

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



Photographing Britannia_0791 in different views with the scale provided in the Awareness handout pack

Discussion

Importance

Sixty-four individual reports were raised during the 2016–2017 reporting year, exceeding the Protocol Implementation Service's expectation of around 50 reports a year.

The finds reported through the Protocol this year are representative of a wide range of periods which bring to light numerous themes, from submerged prehistory (Britannia_0791: mammoth tooth) to the Second World War (Kendalls_0769: fuse box plate). These finds and those from preceding years signify the wealth of archaeological material that exists offshore, the investigation of which is important to expand knowledge of the past.

Key issues

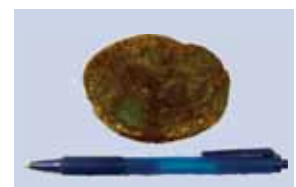
The Protocol has not been rewritten since its inception and has only had minor addendums appended to it relating to the handling of specific finds, demonstrating the robustness and effectiveness of the scheme put in place 12 years ago. Despite this, during each year of Protocol implementation minor operational situations are recognised and the Protocol Implementation Service adapts to meet these needs. This year the following points have been raised for discussion.

Marine Aggregate

The area licensed for dredging has increased by 28.4% in 2016 while the area actually dredged was reduced by 3.5%. The British Marine Aggregate Producers Association (BMAPA) reports growing demand, with overall production increasing by 13% in London and the South East. It comes at a time when the sector is playing a growing role in the overall market, with more than 10% of all primary aggregates in England and Wales now coming from marine sources. The industry satisfies 25% of sand and gravel needs in England and 49% of the equivalent needs in Wales (http://www.mineralproducts.org/documents/Mineral_Products_Today_15.pdf).

Photographic scales

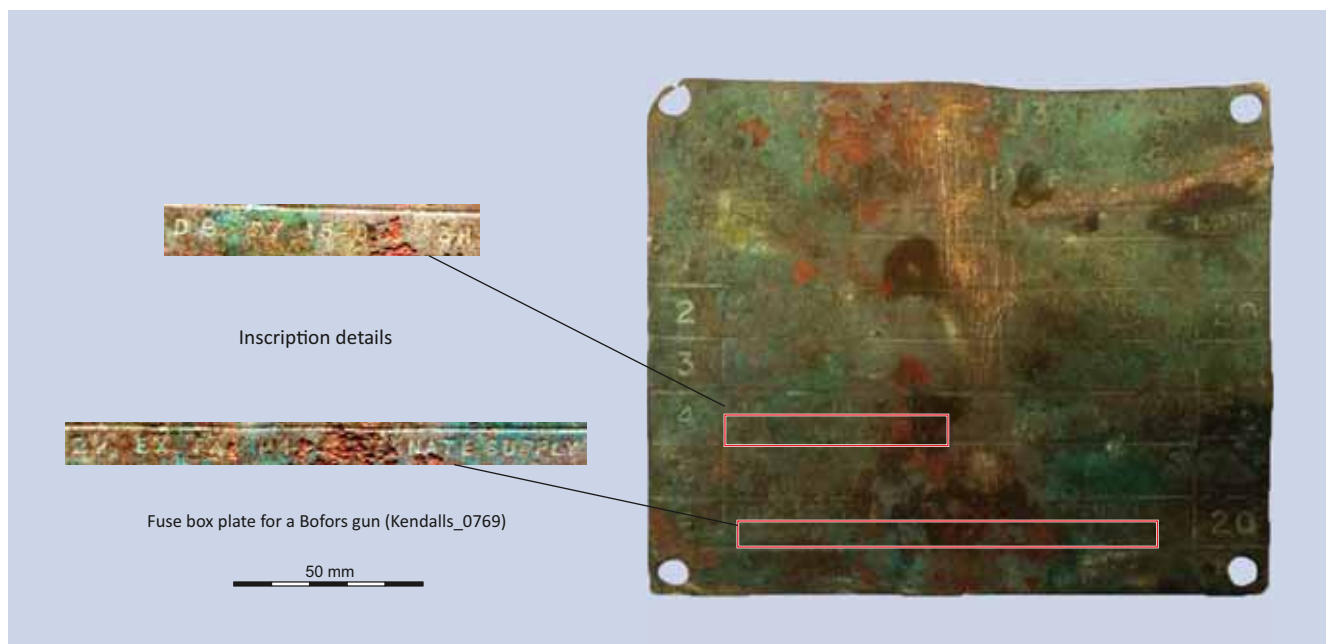
The quality of photographs received has improved significantly since the implementation of the Protocol in 2005. It has been noted this reporting year that more finds than ever are being correctly photographed with the aid of a photographic scale. However, on some of the reports, only one of the images has a scale or there is only a scale along the length of the object rather than the width. The Protocol Implementation Team would like to encourage the use of a scale in all photographs if possible. Images of the finds should be taken with the supplied photographic scale although if one is not available or the lighting is bad, another form of scale can be included in the form of a coin or ruler or pencil. If possible, there should be an image with the scale along the length of the find and one along the width in order for us to better gauge the size of the object. This in particular applies to munitions as the experts can give us more detail on finds such as shells if photographed with accurate scales.



Photographing an object with a pen as a scale



Photographing an object with a coin as a scale



Timely reporting

The Receiver of Wreck must be notified of any wreck-related material within 28 days of it being removed from the seabed. Wreck-related finds include any artefacts that have come from a ship or aircraft. The reporting time limit is a legal requirement of the Merchant Shipping Act 1995 that exists regardless of the presence of a Protocol, and this is why the Protocol Implementation Service team urge all finds to be reported through the console as soon as they are found and will endeavour to contact the reporter and write the report as close to this time frame as possible.

The Protocol Implementation Service Team at Wessex Archaeology

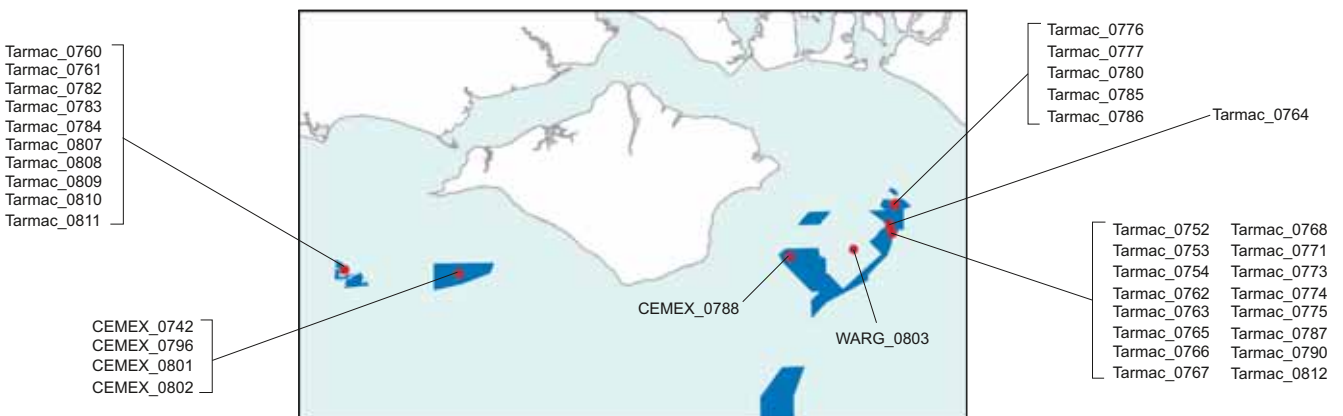
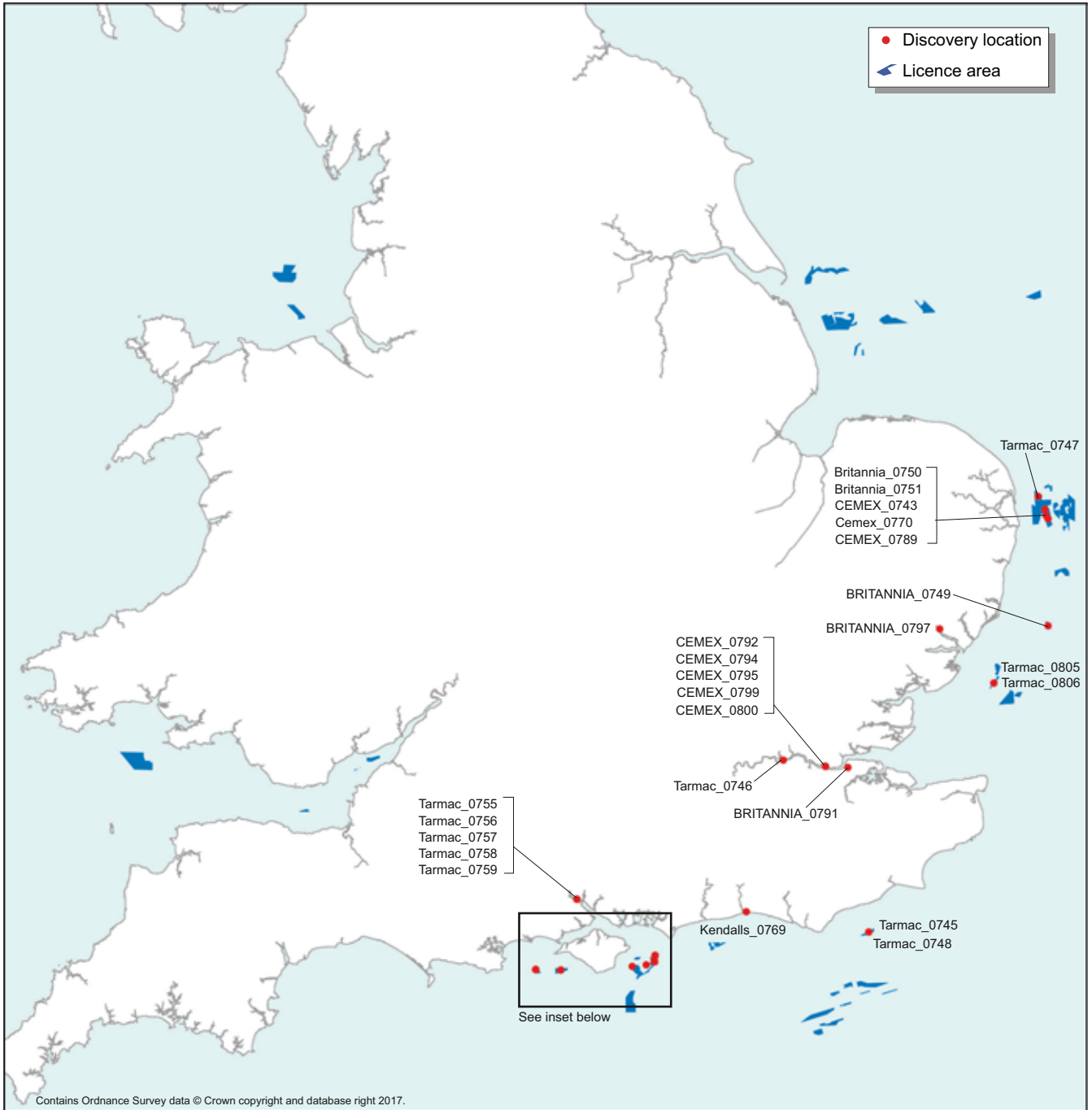
There have been a couple of changes of staff in the Protocol Implementation Service Team at Wessex Archaeology. Team members Peta Knott and Tom Harrison have left. However, Lowri Roberts has joined Vicki Lambert and Alistair Byford-Bates in implementing the scheme. Andrea Hamel continues to manage the project. Any questions or queries can be directed to any member of the team, either directly or via protocol@wessexarch.co.uk. The Protocol email address contacts every member of the Protocol Implementation Service team and we are very happy to help and advise via email, over the phone or in-person through the Protocol Awareness Programme.

Regions with nil return

There were no reports of finds among material dredged from the North West, South West or Humber regions during the 2016–2017 Protocol year. The North West region is targeted for sands, and screens fitted to the dredgers grade material before it enters the hold, probably accounting for the lack of archaeological reports from this region; the only report from this region was made in 2006–2007.

The South West region, however, has previously yielded archaeological material, though reports have only been received only in the reporting years of 2007–2008 and 2014–2015. It is unlikely that the tonnage of material dredged from the South West region can be used to explain the lack of reports, as the tonnage has increased from 1.09 million in 2014 to 1.18 million in 2016. However, this region is only targeted for sand and so screens prevent larger items from being retained. Previous finds could therefore relate to finds trapped in the draghead. The tonnage of material dredged from the North West has also increased from 0.52 million in 2014 to 1.16 million in 2016, although 0.85 million tonnes of this was used as fill for the Liverpool2 container port development, so would never have been landed in a way that presence/absence could be assessed. The North West and South West regions account for approximately 13% of the aggregate dredged in 2016, the last year for which figures are currently published (<https://www.thecrownestate.co.uk/media/1043289/summary-statistics-2016.pdf>).

Discoveries 2015–2016



Artefact patterns and distribution

Through the use of GIS, patterns and trends such as artefact location and concentration can be studied. During the reporting process, licence areas of the objects, if known, are documented. This allows us to assess finds on a regional basis, which is helpful when considering future licence applications within existing dredging regions. Patterns in artefact concentration can potentially identify sites of archaeological interest, or licence areas which are more likely to yield finds of archaeological interest in the future.

Archaeology is not distributed evenly on the seabed. Some areas have a higher potential than others to contain material that entered the archaeological record either accidentally or deliberately. Some areas are known to have been high in Palaeolithic activity when sea levels were lower than the present day. Other areas are known to be post World War II dumping grounds which has become apparent from artefact type and quantity in that area. We also know which licence areas tend to yield more munitions and should be dredged with caution.

Survival of artefacts will depend on the marine environment in which they lie. For example, 87% of the finds reported this year are metal which is not unusual as it tends to be a more durable material in a harsh environment in comparison to materials such as wood. Organic finds such as wood or bone and teeth from the Palaeolithic will be poorly preserved unless they are buried beneath sediment, which may account for the low percentage of finds received of this material. For finds to be discovered, the high potential for loss or discard must coincide with a high potential for the preservation of archaeological materials.

Based on potential and survival, some licence areas will therefore contain more archaeological finds than others and may be associated with more specific time periods more than others. Other factors, such as whether they are found in isolation or grouped with similar items, also add to the context of finds. In most cases, objects are reported as single isolated finds but we do occasionally receive reports of multiple items found in the same location; cannon balls being a prime example. The significance of a find can therefore depend on its location as much as the nature of object in itself.

Distribution of artefacts by dredging region

There are seven dredging regions around the UK:

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

In the 2016–2017 dredging year, a trend established in previous years has continued, with the majority of finds originating from the South Coast region. This year, 73% of the reports raised with the Protocol Implementation Service detailed finds from this region, and 17 out of the 64 reports from this region refer to material from Licence Area 351. The South Coast region yielded 3.75 million tonnes of construction aggregate in 2016, 20% of the total tonnage dredged across all regions (<https://www.thecrownestate.co.uk/media/1043289/summary-statistics-2016.pdf>). It is believed that a known spread of post-war rubble has contributed to the high number of reports from this region.

Three of this year's 64 reports came from the Thames Estuary region, five from the East Coast and two from the East English Channel. Seven reports were from an unknown region as it was not possible to determine the cargo they were recovered from.

No reports were received from cargoes dredged from the South West, North West or Humber regions.

Region	Millions of tonnes of construction aggregate dredged in 2016 (2015 quantity)	Number of finds reported 2016–2017 reporting year (2015–2016 reporting year)
Humber	1.81 (2.14)	0 (2)
East Coast	4.31 (4.47)	5 (2–3)
Thames Estuary	1.94 (2.66)	3 (4–6)
East English Channel	4.65 (3.67)	2 (6)
South Coast	3.75 (3.33)	47 (71–73)
South West	1.18 (1.13)	0 (0)
North West	1.16 (2.05)	0 (0)
Unknown	—	7 (9)

Distribution of artefacts by archaeological typology

Palaeolithic finds

Four finds reported this year are confirmed to be of Palaeolithic date – a mammoth tooth (Britannia_0791) found at Britannia's Cliffe Wharf along with a smaller possible mammoth tooth (CEMEX_0792), and two fragments of possibly mammoth bone (CEMEX_0794 and CEMEX_0795) found at CEMEX's Northfleet Wharf in Kent (see Case Study page 10). Due to the high level of preservation on the largest mammoth tooth (Britannia_0791), it was possible to determine that the species of mammoth this tooth belonged to was a *Mammuthus primigenius* or woolly mammoth; however, the species of other examples of Palaeolithic finds were unidentifiable. Unfortunately, the licence areas of these finds are unknown as they were kept on the wharves where they were found for some time before being given to a member of the Protocol Implementation team. It is thought that all of these examples were dredged from the South Coast region.

Maritime artefacts

Britain has a long maritime history, and therefore it is not surprising to find seafaring-related artefacts in the offshore context; several reports made through the Protocol this year have come from boats or ships. These include ship fittings such as a water pump from the South Coast (CEMEX_0788), a fuel pipe coupler from the South Coast (Tarmac_0780) and a metal pulley block from the East Coast (Tarmac_0747). Other shipping-related finds are a brass porthole ring from the South Coast (Tarmac_0779) and a ship's timber from the East English Channel (Tarmac_0745).

As can be expected from the high density of shipping off the Isle of Wight, a number of ship-related finds were located in Licence Area 351, including a fragment of ship's telegraph face (Tarmac_0762), a ceramic pot or bowl base (Tarmac_0763), a metal drain cover (Tarmac_0764), a water level clamp (Tarmac_0765) and a metal screw lid (Tarmac_0766).

Several metal objects that could have a terrestrial origin and were dumped at sea were reported through the Protocol this year. An example of this is a winding handle (Tarmac_0785), a threaded spike with nut (Tarmac_0786), a gas regulator (Tarmac_0767) and a railway track chair (Britannia_0750).

Despite the high number of ship-related finds this year, none of them are thought to relate to an unidentified wreck site. All of the finds appear to be isolated discoveries, which could have been lost from ships, not with them, or have been moved along the seabed from wreck sites elsewhere.

Ordnance and munitions

A fair quantity of ordnance has been reported through the Protocol this year (12 of the 64 reports).

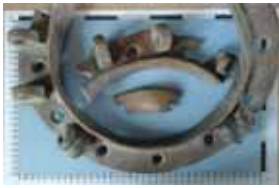
Cannonballs, of varying sizes, have only been found in the South Coast, in Licence Areas 127, 137, 395/1 and 509/2 in the Thames Estuary. Seven individual cannonballs have been reported (CEMEX_0742, Tarmac_0746, Tarmac_0760, Tarmac_0761, Tarmac_0784, Tarmac_0790, Tarmac_0805). Three separate sets of cannonballs were also reported through the Protocol. The largest of these was a collection of 15 cannonballs covered in heavy concretion (Tarmac_0808). The other two collections, Tarmac_0807 and Tarmac_0811 contained five and six cannonballs, respectively (see Case Study page 12).

Of the ordnance reported, very few have been shells and shell casings, with only four being reported. Tarmac_0768 is a heavily corroded fired shell case measuring 130 mm in diameter, with '1952', '19', 'E', '1' and the British Government 'broad arrow' mark displayed on it. CEMEX_0801 is a shell measuring 25 cm in length and 9 cm in diameter. A copper rifling band is present on the base of the shell displaying rifling grooves meaning it has been fired. Suggestions were made to indicate that the shell had perhaps been fired from a 25-pounder field gun. CEMEX_0802 comprised a pair of corroded cannon shells measuring 70 mm and 80 mm. One still has the remains of copper banding. They are both from aircraft-mounted guns.

Conflict, both historical and modern has left a great deal of weaponry, ordnance and military paraphernalia on the seabed and it is anticipated that further evidence of these conflicts will continue to be recovered in the future. **It is always advised that wharf staff should follow company health and safety policies before any archaeological reporting.**

Aircraft

Only one aircraft-related find (CEMEX_0743) was recovered this year, from the East Coast region. Images of the aluminium fragment were sent to a specialist who said that even though he could confirm the fragment belonged to an aircraft, he was unable to identify it.



Porthole ring (Tarmac_0779)



Ship's timber (Tarmac_0745)



Ceramic base (Tarmac_0763)



Threaded spike with nut (Tarmac_0786)



Shell (CEMEX_0801)



Aircraft fragment (CEMEX_0743)



Conclusion

The Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest continues to be relevant to offshore mitigation. In addition, it continues to be a model from which other industries have continued to draw inspiration. It remains a successful and applicable template for preserving heritage on the seabed and for gaining understanding about the unexpected finds that have been discovered. This is reiterated by the high volume of reports received this year from wharf and vessel staff and the contact that has been maintained with several Nominated Contacts and Site Champions this reporting year.

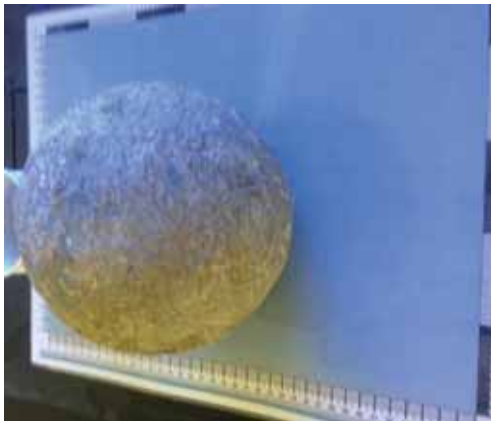
The application of the Protocol ensures that archaeological information is preserved through recording and is disseminated as widely as possible, so that everyone can enjoy and explore our underwater cultural heritage. The addition of a new social media page for the Protocol where reports and images are displayed has aided in the dissemination of information and targets a wider audience than perhaps the *Dredged Up* newsletter alone would reach.

The enthusiasm and diligence of wharf and vessel staff ensures the success of the Protocol. Everyone's support has ensured that the Protocol has become embedded in commercial processes, which in turn reduces the impact of dredging on underwater cultural heritage, and thereby preserves it for future generations. By asking wharf staff to complete a feedback form after their training sessions during future visits, we hope to further engage with those who implement the Protocol and continue to make it a success. Any feedback received through these forms or otherwise will be considered and acted upon to ensure that we are implementing the best version of the Protocol as possible.

The Protocol Implementation Service team would like to thank everyone who has helped to support the Protocol during the 2016–2017 reporting year, as the Protocol enters its thirteenth year.

The future

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



Cemex_0742: Stone Shot

This stone cannonball was discovered in Licence Area 137 in the South Coast dredging region, approximately 8 km south west of the Isle of Wight. M. Pettitt discovered it at Brighton Wharf after unloading *Sand Heron*.

The cannonball measures approximately 180 mm in diameter and has been carved from stone. Stone cannonballs were commonly used during the medieval period in addition to iron or lead. In 1417, 7,000 stone shot were ordered to be made, and they were widely used throughout the 15th and 16th centuries, until preference changed to iron shot in the 1630s as the cost of manufacturing reduced (Caruana 1994, 189).

The type of stone used is unclear without lithological identification. British examples were commonly made from a hard form of limestone known as Kentish Ragstone, one of the few hard stones found in southern England. Although igneous rocks and even marble (in Greece) have been used (Caruana 1994, 189). The size of the cannonball is particularly large, at 180 mm or 7 inches in diameter, this equates to roughly a 42 - 48 pounder cannon; a 48 pounder being the size of the largest French gun during the reign of Louis XIV (1643-1715). As a general rule, stone shot was commonly used with chambered guns.

Stone cannonballs were hand carved from blocks, often using a small pick or a hammer and chisel. This would create some variety in the shape; often the diameter varies slightly as forming a perfect sphere is extremely difficult and time consuming. Gauges were used during the carving process to ensure that the desired size was made. These were usually wooden paddles with a pre-cut hole which would slot over the ball (Hildred 2011, 402). Previously, these have been found on board shipwrecks, such as *Mary Rose*, as many of the stone shot would not be finished until they were already on board the ship. The majority of the 387 examples found during the *Mary Rose* excavations were unfinished (Hildred 2011, 339).

Cannonballs are a common find around the south coast of England as, with an extensive naval history, military training and battles have taken place along this stretch of coastline for hundreds of years. Additionally, other nations would have used the English Channel during military action, trade and transport. With no sea forts or coastal defences along this stretch of the coast, this find is likely to have come from a ship. However, it is not possible to say whether it was fired during training, battle or perhaps just lost overboard. Only one iron cannonball has previously been reported through the Protocol from this area, and with no associated wreckage or further related finds reported, this is likely to be an isolated find.

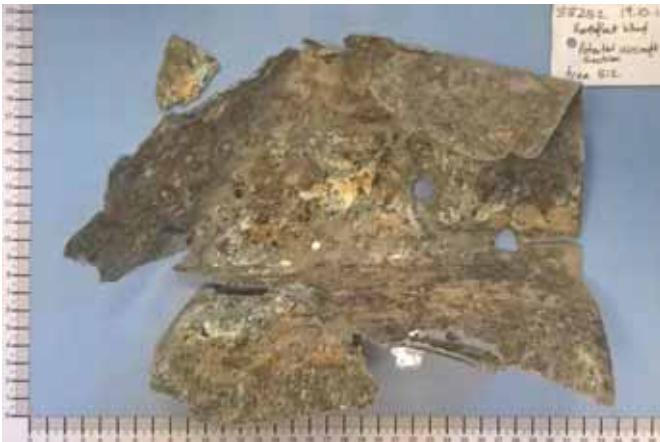
References:

Caruana, AB 1994 *The History of English Sea Ordnance 1523-1875 Volume 1 The Age of Evolution*. East Sussex, Jean Boudroit Publications.

Hildred, A 2011 *Weapons of Warre: The Armaments of the Mary Rose Volume 3*. Portsmouth, Mary Rose Trust.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for the Isle of Wight



CEMEX_0743 Aircraft Fragment

This aircraft fragment was discovered on the wharf at Northfleet. It was in material dredged from Licence Area 512 in the East Coast dredging region. The finder was Peta Knott, an archaeologist with Wessex Archaeology.

CEMEX_0743 is a bent and twisted aluminium fragment with 17 uniform holes of two different sizes punched through it. The aluminium section, or the item mounted onto it, appears to have been ripped out, based on the visible damage. The pattern of corrosion shows an impression of the fixture formally fitted to it, though there are no distinguishing marks or features as to its former use or identity. The pattern of folding, and the closeness of the folds to the line of holes, would suggest that the section of aluminium with what was mounted on it was torn away and became buckled first, before the fitting separated from the remnant of the find.

Images of the object were forwarded to aviation finds expert Steve Vizard who felt based on the quality of the aluminium, its degree and pattern of corrosion and the lay out and form of the holes that it was, on balance, an unidentified aircraft fragment.

Based on this identification, and the current lack of further information, the item is most likely to have arrived in the area through a wartime or accidental loss or through fishing activity moving it into the dredging area.



Though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded aircraft crash site or related debris.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The Ministry of Defence
- The National Record of the Historic Environment
- The Historic Environment Record for Kent



Tarmac_0745: Ship's Timber Fragment

This ship's timber was discovered in Licence Area 460 in the East English Channel dredging region. Barry Gould discovered it on the Erith Wharf.

Tarmac_0745 was described by the finder as a piece of 'distressed wood', that appears to be a hard wood similar to that of a railway sleeper. It has clean drilled holes through it with a finished wooden treenail, stopper or plug in one of these holes. The upper surface with the plug appears to have been a clean cut and polished/sanded surface at one time. The piece appears to have been torn away from the rest of the structure at some point in the past. The staining is also suggestive of an iron object being close by, staining the wood with corrosion products. This may have helped reduce the breakdown of the wood through mineralisation.

The consensus from the finds experts at Wessex Archaeology is that it is an unidentifiable section of ship's timber, or structure, due to the finish of the surface and the quality of the plug/treenail. Without further sections or a chance identification occurring, its function will remain unknown.



Though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 391/16)
- The National Record of the Historic Environment
- The Historic Environment Record for East Sussex



Tarmac_0746: Cannonball

This cast iron cannonball was discovered by Paul Scrace at Greenwich Wharf. The dredging area and vessel are unknown at present.

Tarmac_0746 is a cast iron cannonball weighing 1132g or just under 2.5 lbs. and measuring 70 mm in diameter or $2\frac{3}{4}$ ".

Cannonballs or round shot are one of the earliest forms of projectiles fired from cannons. Round shot was made in early times from dressed stone and from iron by the late 15th century until the early 19th century. Due to the ubiquitous nature of their design, it is difficult to accurately date cannonballs with any certainty. This issue is compounded by the wide variation in designs and calibres of the cannons that fired them and the lifespan of the weapon, with obsolete designs often still in use on merchant ships long after they had fallen out of service with the various navies of Northern Europe, who also used captured prize weapons on their vessels (Brown, 1997).

Based on its size it is most likely to have been fired from a cannon known as an Ordinary Minion before Borgard's standardisation of ordnance during the early 18th century. A common mobile cannon, it was used by English naval and land forces in the late 16th century for signalling and close quarters fighting. Carpenter's 1993 list of Tudor Ordnance describes them as smooth bore muzzle loaders, made of brass or iron, with a 3" calibre, firing a $2\frac{3}{4}$ " cannonball, weighing 800 lbs, 7' in length, and with a maximum range of 1200 paces, with a point blank range of 120 paces.

This cannonball is considered an isolated object. However, any further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible wreck site. As metal artefacts from marine contexts are very unstable once they are removed from the seabed, in the short term the most effective treatment is to keep them submerged in fresh water.

References:

Brown, R.R., 1997. Arms and Armour from Wrecks: An Introduction. In: Redknapp, M. (Ed), 1997. Artefacts from Wrecks. Oxbow Monograph 84. Oxbow Books, Oxford.

Carpenter, A.C., 1993. Cannon. The Conservation, Reconstruction and Presentation of Historic artillery. Halsgrove Press, Tiverton.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 392/16)
- The National Record of the Historic Environment
- The Historic Environment Record for West Sussex

Tarmac_0747: Metal Pulley Block



This metal pulley block was discovered in Licence Area 254-Marcon, in the East Coast dredging region. Brad Troubridge discovered it at Greenwich Wharf.

This heavily corroded metal block or pulley with a swivel ring and becket on opposite ends, was recovered during dredging operations off the East Coast. The sheave pin is secured with an extended tine split pin and has a sunken locking head. Unusually, for a moving part, there does not appear to be a washer fitted. No makers or manufacturers marks were described as being visible. The becket is the fixed ring to which the standing part of the rope would be attached if two blocks were being used.

Its construction points to this being of relatively modern date in terms of its design and materials used. As a single sheave pulley it is designed for relatively light work as the recommendation is for the sheave diameter to be at least five times the rope diameter and a single sheave block imparts no mechanical advantage. For any advantage it therefore needs a second block to reduce the mechanical effort required.

As with many isolated finds its route into the maritime environment is unknown. It may have been lost overboard during day to day ship operations or it might have come from an unknown wreck and been moved through fishing or other activity. As with all finds of this nature its reporting may help to identify a lost or unknown wreck.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 393/16)
- The National Record of the Historic Environment
- The Historic Environment Record for East Sussex



Tarmac_0748: Unknown Object

This unusual object was discovered in Licence Area 460 in the East English Channel dredging region. Bradley Trowbridge discovered it at Greenwich Wharf.

Iron and brass, handle lever. The brass piece has serial number 2404 stamped on it. The object is just over 300 mm long and 150 mm wide at brass section. The clamp appears to have been designed to act in a similar manner to mole grips or stillsons and allowing leverage to be applied to the brass section of the device. Whether the cable tie was in place at recovery or added to keep the parts together is not known.

The function of this apparently 'homemade' lever is currently unknown and how it entered the marine environment can only be presumed. Based on this, and the current lack of further information, the item is most likely to have arrived in the area through an accidental loss or mishap, and it is possible that fishing activity moved it into the dredging area. It does not appear old enough to be a wartime related loss.



Though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 394/16)
- The National Record of the Historic Environment
- The Historic Environment Record for East Sussex



Britannia_0749: Track Chair

This railway track chair was discovered in Licence Area 498 in the East Coast dredging region, approximately 60 km south-east of Great Yarmouth. David Benneworth discovered it at Ipswich Wharf in the cargo from the Scelveringhe

Britannia_0749 is described as a large heavy object, with 'LNER 82', 'S2' & '1928' embossed on its base. It is a three bolt London and North East Railway track chair, 'S.2' is the type of chair, and indicates where it should be used, and 1928 is the year of manufacture. The meaning of the '82' is not currently known, though is probably an internal company type or design code.

The earliest rail chairs were made of cast iron and introduced around 1800 to support cast-iron rails at their ends and join adjacent rails. With the development of the rolled T-shaped and I-shaped rails after 1830; additional support along the length of the rail was required. Originally, an iron key was used to wedge the rail into the vertical parallel jaws of the chair; though these were quickly superseded by wooden keys. The wooden keys were formed from oak, steam softened and then compressed with hydraulic presses and stored in a drying house. When inserted into the chair, exposure to the wet atmosphere caused them to expand, firmly holding the rail. These wedges could be fitted on the inside or outside of the rail, in the UK they were usually on the outside, though local variations occurred. The chairs are fixed to the sleeper using either wood or metal spikes, screws, or bolts. In most of the world, flat-bottomed rail and baseplates gradually superseded the original rail designs, however, in the UK, bullhead rail-and-chairs remained in use until the middle of the twentieth century. They are now largely obsolete but can still be found on the London Underground, some sidings and at London Waterloo Platforms 1-4.

The London and North Eastern Railway (LNER) was the second largest of the "Big Four" railway companies created by the Railways Act 1921 in the UK. It operated from 1923 until nationalisation in January 1948. At that time, it was divided into the new British Railways' Eastern Region, North Eastern Region, and partially the Scottish Region

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck, or from material lost or thrown overboard during every day shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Suffolk



Britannia_0750: Brass Pintle

This brass pintle was discovered in Licence Area 228, in the Thames Estuary dredging region, approximately 30 km south-east of Great Yarmouth. Davy discovered it at Brett Aggregates, Cliffe in Kent.

This bronze pintle pin is approx. 240 mm long and 60 mm in diameter. There are two possible origins for this item based on the available information. Firstly, it is part of the furniture for fixing a heavy door or gate; or secondly it would have fixed the rudder to a ship. The straps that would fix it to the rudder or hanging post appear to have been broken off and the image below left shows the degree of wear that it has suffered whilst in use from the gudgeon, which it would pivot on, fixing the rudder to the ship or gate/door to the post. They are generally robust and made of corrosion resistant materials as any failure could be catastrophic. They were generally fastened with through bolts between the straps or nails and the number used would be dependent on the size of rudder, gate or door.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck, or from material lost or thrown overboard during every day shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Suffolk.



Britannia_0751: Timber

This piece of timber was discovered in Licence Area 228, in the East Coast dredging region, approximately 30 km south-east of Great Yarmouth. Davy discovered it at Brett Aggregates, Cliffe in Kent.

Described by the finder as a ship timber with bronze nail, this broken off board is approximately 750 mm long, 150 mm wide and 50 mm deep with a bronze nail 160 mm long and 8 mm across with a square profile and square bevelled head.

Following discussion with finds experts at Wessex Archaeology the consensus is that this probably from a timber groyne, rather than a ship wreck. The damage and erosion that it has suffered is more consistent with material that has been periodically covered and uncovered by the tide, as opposed to a ship's timber that is permanently immersed, the lack of marine borer damage is also indicative of this. The damage is also consistent with the abrasion that groynes suffer and a board being broken off by the action of the sea or other mechanical force.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include storm damage or material lost during repairs. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded activity or relate to an unknown past process.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Suffolk.



Tarmac_0752: Wrought Iron Pin

This wrought iron fastening was discovered in Licence Area 351 Nab in the South Coast dredging region, approximately 13 km southeast from the Isle of Wight. Jamie Jewell discovered it Marchwood Wharf, Southampton.

Tarmac_0752 appears to be the extant remains of a heavily worn and corroded wrought iron pin with a flattened head, one end tapering slightly to the opposite end which has been truncated through some unknown event in the past, or due to the corrosion process. Evidence of this can be seen on the midsection of the shaft where the pin has been in contact with another material and by its colour, indicating the ongoing oxidation process to the iron. The object is approximately 100 mm long and 24 mm wide at the head end.

Wrought iron has been used for many centuries in ship building and industry and is generally the form of iron referred to in early references on the use of iron. Popular due to its tough, malleable, ductile, corrosion-resistant and easily welded nature, it was only replaced as the cost of steel production fell. The other form of iron, cast iron did not come into widespread usage in Europe until the 15th century, and even then, due to the issue of its brittleness, was not widely used. A notable exception was the relative success of English cast iron cannons. Wrought iron is an alloy of iron with a low carbon content when compared to cast iron, *i.e.* less than 0.08% compared to 2.1-4%. Its semi-fused iron mass with fibrous slag inclusions give it the instantly recognisable grainy, wood like, appearance that shows when it is corroded or stressed. The demand for wrought iron peaked in the 1860s with the demand from the expansion of the railways and the development of ironclad warships, before improvements in steel processing, quality, and costs superseded it. For this reason, wrought iron is no longer commercially made on an industrial scale with the last plant in the world, based in Bolton, Lancashire, closing in 1973.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes, which could include an unknown wreck site or could be from material lost or thrown overboard. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 012/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight.



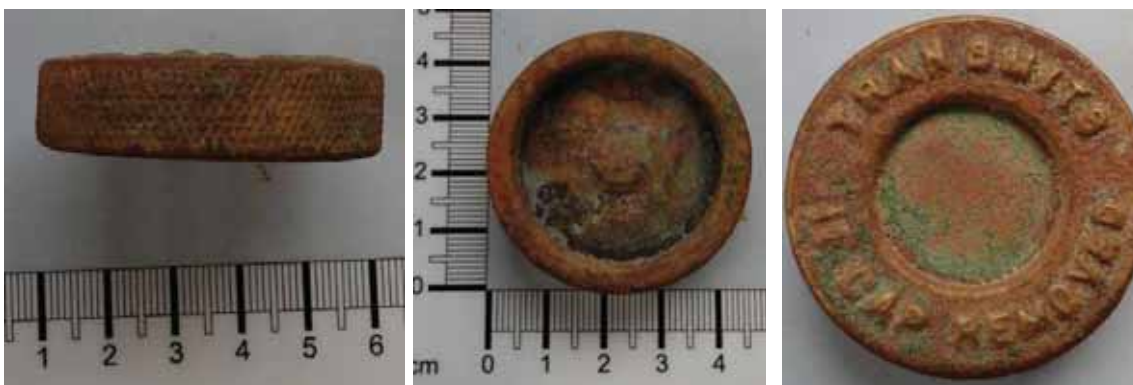
Tarmac_0753: Brass Cap

This stamped brass cap was discovered in Licence Area 351 Nab in the South Coast dredging region, south east of the Isle of Wight. Jamie Jewell discovered it at Marchwood Wharf.

This 45 mm diameter circular cap has a knurled edge, a rolled base and 'TRANSMITS IF CAP REMOVED' in raised letters around the raised edge of the upper surface. The rolled edge to the base suggests that it might have contained a rubber seal or washer at some time in the past to help seal it down or prevent water ingress.

This item currently remains unidentified in terms of its function and the equipment it came off. Discussion with aviation and shipping related finds experts have shed no further light on this object currently. As shipboard wireless telegraphy, did not become established until after 1910 and radiotelegraphy after 1920, with aircraft systems even later it is probable that this item dates from the 1940-50s and from some form of military communication system.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck or aircraft crash site, or from material lost or thrown overboard during every day shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 013/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight and Hampshire.



Tarmac_0754: Driving Band Fragment

This metal plate fragment was discovered in Licence Area 351 in the South Coast dredging region, south east of the Isle of Wight. Jamie Jewell discovered it Marchwood Wharf, near Southampton.

Tarmac_0754 appears to be a 140 mm x 75 mm very worn fragment from the driving band of a large artillery/naval shell, of a design similar to an Elswick Ring. Its design would suggest that it is of late 19th or early 20th century origin and between 420-520 mm in diameter.

They are usually made from copper, gilding metal or occasionally sintered iron, modern ones can also be of nylon or other plastic construction. Their purpose and design is to prevent loss of gas from the firing charge escaping around the projectile and to impart spin to the projectile, therefore stabilise it in flight. Providing spin to a cylindrical projectile introduces gyroscopic forces which keep the projectile flying point first. To achieve this, some form of rifling in the bore of the weapon is required along with a method of transferring this spin to the projectile, which is where the driving bands come in. Due to the energy involved and the need to transfer that energy with minimal loss the bands are grooved on both sides, one to engage with the weapons rifling, and the other with ribs or grooves cut into the body of the shell to prevent the band from moving separately to the shell as it travels up the barrel of the gun.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes, such as from an unknown wreck site, from a weapons range or conflict. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site, related debris field or conflict zone.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 014/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight and Hampshire



Tarmac_0755: Cutlery Handle



This stainless steel cutlery handle was discovered by M. Wooldridge at Tarmac's Marchwood Wharf, Southampton. The dredging area it was from is unknown, however, it is likely to have been one of the south coast licensed areas.

Tarmac_0755 is the corroded remains of a stainless steel piece of cutlery with the manufacturer's name 'HM & CO', product code '514435' and date of manufacture '1964', stamped on it. From the extant remains it appears to be the handle of a serving spoon or ladle.

The HM & Co corresponds to Harris, Miller and Co., a Sheffield cutlery company based at the Emu Works in Eyre Street, Sheffield. They supplied cutlery to a wide number of users including the Government for hospitals and prisons, BOAC and British Airways. They appear to have finally closed in the 1990s following a large fire on their site. Their cutlery was also branded HM & Co David Mellor, who was a well-known designer. In some cases, there will also be the British Government Broad Arrow stamped on the item, though not in the case of this example.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. The most likely source is material lost or thrown overboard during every day shipboard operations or from dumping at sea. Its date of manufacture would preclude its loss with an aircraft or shipwreck, as any losses from this period are likely to be well known. However, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded site or debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 015/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight and Hampshire

Tarmac_0756: Gear Mechanism



This shaft fragment of a gearing system was discovered by M. Wooldridge at Tarmac's Marchwood Wharf, Southampton. The dredging area it was from is unknown, however, it is likely to have been one of the south coast licensed areas.

Tarmac_0756 is a chrome alloy or similar material object 155 mm long. It appears to be part of a gearbox or engine. No maker's marks or other identifying features are present and the piece appears to have been sheared off and corroded on one face. The toothed and threaded shaft appears to be undamaged apart from corrosion products being present.

The consensus, following discussion with various finds experts, on this item is that it is unlikely to be from an aviation source but more likely to maritime or terrestrial in origin. Its exact function is currently unknown though it has some of the characteristics of a sleeve valve crank.

How this object entered the maritime environment is not clear as it may have arrived there via a number of routes. These may include an unknown wreck, lost overboard during day to day shipboard operations or through being dumped. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 016/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight and Hampshire



Tarmac_0757: Link Arm

This possible link arm was discovered by M. Wooldridge at Tarmac's Marchwood Wharf, Southampton. The dredging area it was from is unknown, however, it is likely to have been one of the south coast licensed areas.

Tarmac_0757 appears to be a cast iron or steel, offset, throttle linkage of the type that use to be seen on older, *i.e.* pre-electrical operated and controlled, tractors and heavy plant diesel engines. It is approximately 125 mm long with two different sized toothed holes, at opposite ends, tapering from the larger opening down to the smaller one. These are offset but parallel to each other. Originally they would have been linking the hand or foot throttle to the throttle body, via a rod and lever system, so controlling the amount of air entering the engine, and hence the power.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. This include an unknown wreck site or from material lost or thrown overboard. Therefore, though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 017/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight and Hampshire



Tarmac_0758: Engine Poppet Valve

This engine valve was discovered by M. Wooldridge at Tarmac's Marchwood Wharf, Southampton. The dredging area it was from is unknown, however, it is likely to have been one of the south coast licensed areas.

Tarmac_0758 is a 350 mm long engine poppet valve with no apparent maker's marks or identification visible. It is lightly corroded and still shows its fine detail. This would suggest that it is of relatively recent origin, and of marine or terrestrial origin, or was buried in the seabed. The probable recent date is reinforced by the fact that it shows none of the damage one would expect, from a piston engine aircraft crash or the breakup of one over the water, followed by up to 70 years of immersion.

A poppet valve is typically used to control the timing and quality of the fuel or air flowing through the intake and exhaust ports into and out of the chambers of an engine. They have existed in various forms since the 1770s when James Watt used them on his steam engines.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes, including from an unknown wreck site, an aircraft crash site, or from material lost or thrown overboard. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 018/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and Isle of Wight.



Tarmac_0759: Brake Shoe

This badly corroded brake shoe was discovered by M. Wooldridge at Tarmac's Marchwood Wharf, Southampton. The dredging area it was from is unknown, however, it is likely to have been one of the south coast licensed areas.

Tarmac_0759 is a heavily corroded curved piece of steel with eroded mounting holes through one surface. It appears to be the remains of a drum brake shoe. They are usually manufactured from two pieces of steel welded together, referred to as the web, and are usually a crescent shaped section with holes in. These would hold the return springs, self-adjusters and other components for forcing the shoe against the drum, with the braking friction material riveted or glued to the outer surface or lining table of the shoe.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes, which could include an unknown wreck site or from material lost or thrown overboard. Therefore, though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 019/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight



Tarmac_0760: Cast Iron Cannonball

This cast iron cannonball was discovered in Licence Area 127 in the South West Needles licence area. Jon Jerromes discovered it at Southampton Wharf.

Tarmac_0760 is described as a 3½ in (8.9 cm) heavily concreted cast iron cannonball.

This is an unusual sized cannonball, which appears to predate the standardisation of ordnance that occurred in the early 18th century in England. The closest weapon listed by Carpenter (1993) firing this size shot is a Saker or Saker drake. These were a medium sized cannon developed during the 16th century, and were used heavily by the English Navy. They had a bore diameter of between 3½-4 in and fired a round shot of between 8.2-9.5cm (3¼-3¾ in), weighing between 2.15-3.4 kg (4¾-7½ lb). There were also breech loading swivel guns that fired a similar sized shot of either stone or cast iron and were known under a variety of names covering a number of variations in design and calibre, these included Sling, Base, Portingale and Murder from before the Tudor period through to the 18th century. These same names, however, applied to a variety of different calibres and sized weapons. Slings for example varied in size from between 2¼-4½ in in calibre (Smith 1995).

Due to the ubiquitous nature of their design, it is difficult to accurately date cannonballs with any certainty. This issue is compounded by the wide variation in designs and calibres of the cannons that fired them and the lifespan of the weapon, with obsolete designs often still in use on merchant ships long after they had fallen out of service with the various navies of Northern Europe, who also used captured prize weapons on their vessels (Brown 1997).

This cannonball is considered an isolated object. However, any further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References:

- Brown, R.R., 1997. *Arms and Armour from Wrecks: An Introduction*. In: Redknap, M. (Ed), 1997. *Artefacts from Wrecks*. Oxbow Monograph 84. Oxbow Books, Oxford.
- Carpenter, A.C., 1993. *Cannon. The Conservation, Reconstruction and Presentation of Historic artillery*. Halsgrove Press, Tiverton.
- Smith, R.D., 1995. *Wrought-Iron Swivel Guns*. In: Bound, M. (Ed.), 1997. *The Archaeology of Ships of War*. Antony Nelson, Oswestry.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 020/17)
- The National Record of the Historic Environment
- The Historic Environment Record for the Isle of Wight and Hampshire.



Tarmac_0761: Cannonball

This cast iron cannonball was discovered in Licence Area 127 in the South West Needles licence area. Jon Jerromes discovered it at Southampton Wharf.

Tarmac_0761 is described as a $3\frac{1}{2}$ in (8.9 cm) cast iron cannonball. This cannonball was found in the same area as Tarmac_0760, and though there is no direct connection between them, they are the same unusual size, and therefore perhaps predate the standardisation of ordnance that occurred in the early 18th century in England. However, due to their ubiquitous nature, it is difficult to accurately date cannonballs with any certainty. This is compounded by the wide variation in designs and calibres of the cannons that fired them. A further issue is the potential lifespan of a cannon, with obsolete designs often still in use on merchant ships long after they had fallen out of service with the various navies of Northern Europe, who also used captured prize weapons on their vessels (Brown 1997).

The closest cannon, listed by Carpenter (1993), firing this size shot is a Saker or Saker drake. These were a medium sized muzzle loaded cannon developed during the 16th century, and heavily used by the English Navy, particularly during Henry VIII's expansion of the navy. They had a bore diameter of between $3\frac{1}{2}$ -4 in and fired a round shot of between 8.2-9.5 cm ($3\frac{1}{4}$ - $3\frac{3}{4}$ in). These weighing between 2.15-3.4 kg ($4\frac{3}{4}$ - $7\frac{1}{2}$ lb).

In addition to the muzzle loading cannons there were breech loading swivel guns that fired a similar sized shot of either stone or cast iron. Known under a variety of names, including Slings, Bases, Portingales and Murders, existing from before the Tudor period through to the 18th century, when they came back into common service after a decline in use over the previous two centuries. The names, however, were applied to a variety of different calibres and sized weapons; Slings for example varied in size from between $2\frac{1}{4}$ - $4\frac{1}{2}$ in in calibre (Smith 1995); so linking this example to a particular type of gun is not possible.

This cannonball is considered an isolated object. However, any further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References:

- Brown, R.R., 1997. Arms and Armour from Wrecks: An Introduction. In: Redknap, M. (Ed), 1997. Artefacts from Wrecks. Oxbow Monograph 84. Oxbow Books, Oxford.
- Carpenter, A.C., 1993. Cannon. The Conservation, Reconstruction and Presentation of Historic artillery. Halsgrove Press, Tiverton.
- Smith, R.D., 1995. Wrought-Iron Swivel Guns. In: Bound, M. (Ed.), 1997. The Archaeology of Ships of War. Antony Nelson, Oswestry.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 021/17)
- The National Record of the Historic Environment
- The Historic Environment Record for the Isle of Wight and Hampshire.



Tarmac_0762: Telegraph Face

This fragment of ship's telegraph face was discovered in Licence Area 351 in the South Coast dredging region, approximately 6.5 km South East of the Isle of Wight. James Lutman discovered it Bedhampton Wharf from a cargo off the Arco Dee.

Tarmac_0762 is a 270 mm wide fragment of the brass face off a ship's telegraph or chadburn off a brass pedestal style telegraph. The damage and wear on the surfaces appear to have worn any lettering away. No text or identifying marks are visible on the object. Unfortunately, no further information on this object has been found at present.

Though telegraphs are traditionally thought of as having an engraved and painted, or white enamelled and painted face, with the engine instructions on them, some designs had a separate indicator with a plain brass dial for the levers transmitting the instructions to the engine room. An example of this variation was manufactured by Begg & Greig PTY Ltd. based in Sydney, Australia and fitted to Second World War destroyers. Other designs had windows in the face and it is possible that the missing part of this telegraph face contained these. With the development of electronic indicators these designs have gradually disappeared from modern ships.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. The most likely sources are from a shipwreck or military action, material lost or thrown overboard during every day shipboard operations or from dumping at sea. However, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded site or debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 022/17)
- The National Record of the Historic Environment
- The Historic Environment Record for the Isle of Wight and Hampshire



Tarmac_0763: Pot Base

This base of a pot was discovered in Licence Area 351 in the South Coast dredging region, approximately 6.5 km South East of the Isle of Wight. James Lutman discovered it Bedhampton Wharf from a cargo off the Arco Dee.

Tarmac_0763 is the base of a white pearlware bowl or pot, a 19th century variant of refined whiteware. It is approximately 90 mm in diameter with the manufacture's logo, a fouled anchor and 'LEA[D]LESS GLAZE' visible in blue transfer print on the base. No impressed date stamp is visible, though Minton's did not always do this. The Minton logo shown was in use between c. 1873-1912, though the word 'England' was generally added from 1891 and replaced by 'Made in England' in 1902. The fouled anchor would suggest this is part of a naval commission for the company. In the 19th century the Minton factory was one of the most popular sources for made to order dinnerware for embassies and heads of state. Though the company no longer exists its brand is now part of the Waterford, Wedgwood and Royal Doulton Group.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes, including from an unknown wreck site or from material lost or thrown overboard. Therefore, though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Reference: G A Godden, 1964, *Encyclopaedia of British Pottery and Porcelain Marks*, 442, no. 2713.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 023/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight



Tarmac_0764: Scupper Grate

This brass or bronze deck or drain grate was discovered in Licence Area 351 in the South Coast dredging region, approximately 13 km South East of the Isle of Wight. Gary Cooper discovered it Bedhampton Wharf from a cargo off the Arco Dee.

Tarmac_0764 appears to be small circular deck grate, vent or drain cover 95 mm wide with mounting holes on opposite sides. There are no visible markings or stamped details. It appears to have been painted at some, though this may be corrosion products as there is also visible iron staining on the underside. Designed to stop the blockage of the scuppers or loss of small loose items, their design has little changed over time beyond the transition from wood to iron and steel built ships; though stainless steel has replaced brass as the first choice of material for their manufacture.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. These include an unknown wreck site or from material lost or thrown overboard. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.

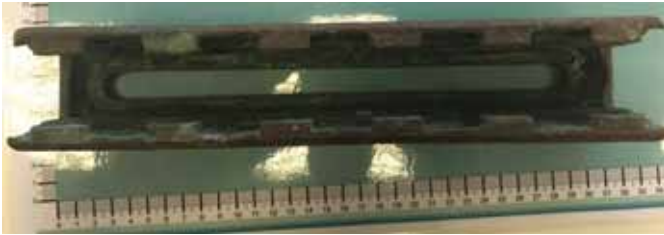


Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 024/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight



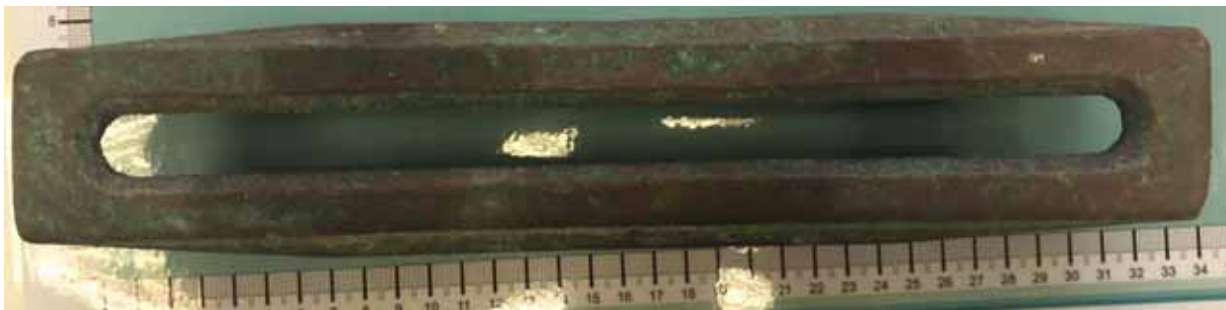
Tarmac_0765: Water Level Clamp



This unusual metal object was discovered in Licence Area 351 in the South Coast dredging region, approximately 6.5 km South East of the Isle of Wight. Dean Lutman discovered it Bedhampton Wharf from a cargo off the Arco Dee.

Tarmac_0765 is the cover of a bronze water level gauge from a steam engine boiler. It is approximately 340mm long, 90mm deep and 70mm wide with 'BRITISH MADE', 'BK-18/7', 'ORIGINAL KLINGER' and the company logo visible on the side of this object. Finds expert and Marine Engineer Anthony Mansfield stated it would have had a strip of glass about 10 mm thick that would have sat behind the slot and then the main body of the gauge would be against the glass with a sealing gasket. A rear clamp with screws would have slotted into the dogs and tightened the whole arrangement on the boiler. As can be seen it is missing the sight glass, level gauge and the pipework and taps for connecting it to the boiler. They were used as a visual check of the water level in the boiler and therefore designed to withstand the pressure in the boiler, hence its robust size and nature. Additionally, they had to protect the gauge from damage in the environment of a ships boiler room.

How this object entered the maritime environment is not clear as it may have arrived via several routes. The most likely source is from a shipwreck or military action, material lost, or thrown overboard during every day shipboard operations or from dumping at sea. However, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded site or debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 025/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight



Tarmac_0766: Hydrant Cap

This brass hydrant/fuel pipe screw cap was discovered in Licence Area 351 in the South Coast dredging region, approximately 6.5 km South East of the Isle of Wight. Gary Cooper discovered it Bedhampton Wharf from a cargo off the Arco Dee.

Tarmac_0766 is a brass hydrant or fuel pipe cap. It is approximately 90 mm wide and 30 mm deep with two lugs to assist turning, and a mushroom shaped fitting in its top centre for attaching a securing lanyard to. There are no visible markings on its surface or interior. There appears to be the remnants of a seal on the inside of the cap. The green paint visible on its surface suggests that it might be from a domestic heating oil tank filler pipe, though this is speculative as a similar colour is used on military fire appliances.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. The most likely sources are from a shipwreck or military action, material lost, or thrown, overboard during every day shipboard operations, or from dumping at sea. However, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded site or debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 026/17)
- The National Record of the Historic Environment
- The Historic Environment Record for the Isle of Wight and Hampshire

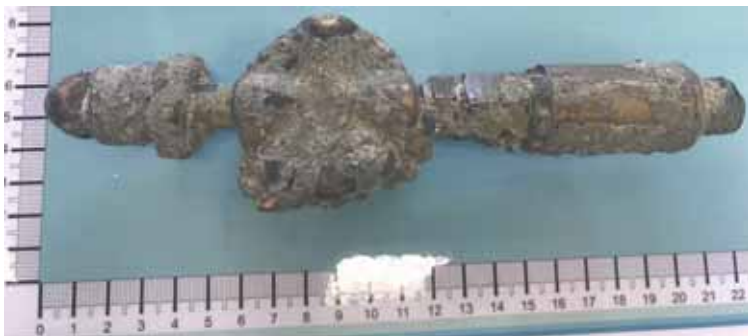
Tarmac_0767: Gas Regulator



This damaged brass gas pressure gauge was discovered in Licence Area 351 in the South Coast dredging region, approximately 6.5 km South East of the Isle of Wight. Gary Cooper discovered it Bedhampton Wharf from a cargo off the Arco Dee.

Tarmac_0767 is the remnants of a brass gas regulator, approximately 200 mm long and encrusted with marine debris. There appears to be no manufacturer's marks or stamps visible on the surface of this find. The function of a regulator is to supply gas at a constant pressure according to the demand placed on it, therefore this example appears to be missing its pressure adjustment valve, cover, diaphragm and other internal parts.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. The most likely sources are from material lost, or thrown, overboard during every day shipboard operations, or from dumping at sea. However, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded site or debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 027/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight



Tarmac_0768: Shell Case (Preliminary Report)

This heavily corroded shell case was discovered in Licence Area 351 in the South Coast dredging region, approximately 6.5 km South East of the Isle of Wight. Gary Cooper discovered it Bedhampton Wharf from a cargo off the Arco Dee.

Tarmac_0768 is a heavily corroded fired shell case, 130 mm in diameter with '1952', '19', 'E', '1' and the British Government 'broad arrow' mark on it.

The '1952' is the date of manufacture, the 'E' the site of manufacture, the '19' indicates the batch number, and the '1' is possibly the gun mark number, though this would be unusual considering the manufacturing date. The 'N' indicates it is a naval round, most probably a five-inch one based on the measurements. Further detail on the percussion fuse and the origin of this shell case may be possible to discover with the use of polynomial texture mapping to bring out further detail of the other markings on its base.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. The most likely source is from training or material thrown or dumped overboard during shipboard operations. However, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded site or debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 028/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight



Kendalls_0769 Copper Plate

This copper plate was discovered in the South Coast dredging region. Fraser MacGregor discovered it at Shoreham Wharf.

Kendall_0796 is described as a copper/brass plate with embossed letters and numbers. It is 160 mm by 135 mm with mounting holes in the four corners. It is heavily patinated and abraded from its time under water. The object is a fuse box plate: the first figure indicates the circuit number, and the last one is the fuse rating. The text in the centre column is what is on the different circuits. Circuit two appears to refer to 'BOFORS G1 VIA A[C] O S NORMAL SUPPLY 02 DK'. Circuit four has 'D.B G7 - 15 - D[?] 3 H 2' visible and circuit six appears to be the '2[?] EX [?]' '[ALTER]NATE SUPPLY'. This suggests that it is from a Bofors gun mount.

The Bofors gun was a Swedish anti-aircraft gun developed in the 1930s and widely adopted, being used by both the Allied and Axis powers during the Second World War, and still in use until the 1980s by the Royal Navy. Electricity powered the fire control system, in combination with an electromechanical analog computer to calculate firing solutions, *i.e.* where to aim the gun based on the target aircraft's speed and direction.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck, or from material lost or thrown overboard during shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for West Sussex



Cemex_0770: Webbing Net

This webbing net was discovered in Licence Area 512 in the South Lowestoft dredging region, approximately 18 km south-east of Great Yarmouth. Bob Hebblethwaite discovered it on board *Sand Fulmar*.

Cemex_0770 is described by the finder as webbing net with associated aluminium fittings, possibly a drag parachute from a mine or bomb. No measurements were given for this object.

The origin of this mesh netting is not clear, initially thought to be a cargo net, further research suggests, that based on its size it is the drogue parachute from an air dropped torpedo or sonobouy. The Royal Navy's Merlin Mk2 helicopters deploy the training version of the Sting Ray torpedo, and it is possible that the parachute, once separated from the torpedo would travel some distance, if not recovered at the time of deployment with the practice torpedo. Another possibility based on the unusual aluminium frame is that it is part of an experimental air to air refuelling drogue, that has been lost. More recent designs have metal braces for all the petals of the drogue, but early experimental versions were made in a range of designs.

How this object entered the maritime environment is not clear as it may have arrived via several routes, as discussed above. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Suffolk



Tarmac_0771: Unknown Object

This unknown item was discovered in Licence Area 351 in the South Coast dredging region, approximately 13 km south-east of the Isle of Wight. Rob Malloy discovered it on board the *City of Chichester*.

Tarmac_0771 comprises two items of iron/steel origin based on the corrosion products present. One looks much like an engine valve, whereas the other appears to part of a badly damaged electric motor or similar, with evidence of severe mechanical damage in the past, as none of the surfaces appear to show recent damage or clean surfaces. It is not clear whether they are associated. Currently these objects have not been identified and therefore their origin is unknown. Their construction points to a modern origin for both items and probably mid to late 20th century, based on the degree of corrosion.

How these objects entered the maritime environment is not clear as they may have arrived via several routes. This may include an unknown wreck, or from material lost or thrown overboard during every day shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight



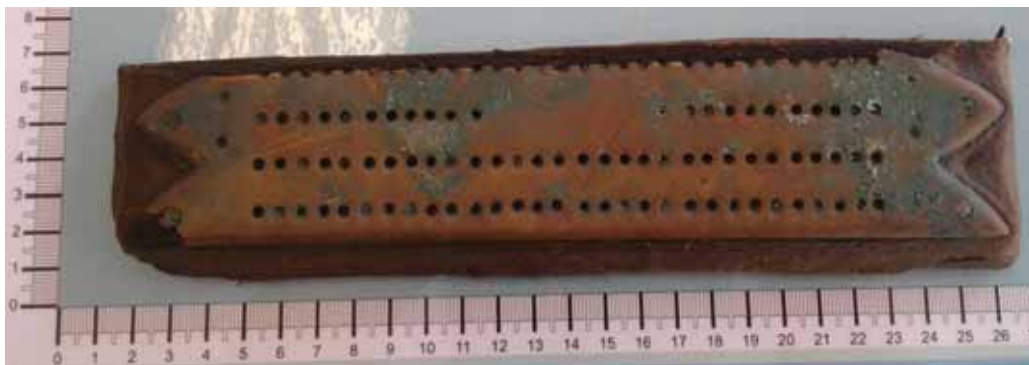
Tarmac_0773: Hand Brush

This partial hand brush was discovered in Licence Area 531 in the South Coast dredging region, approximately 13 km south-east of the Isle of Wight. Dean Luttmann discovered it at Bedhampton Wharf in an *Arco Dee* cargo.

Tarmac_0773 is described as a brass plate with holes mounted on a wooden base. The images show it is approximately 250 mm by 60 mm in size with a screwed down fishtail pattern brass plate with two lines of holes and a line of interrupted holes in its surface. There appears to be a break along another line of holes on one side and this wooden edge on this side appears to have been broken off.

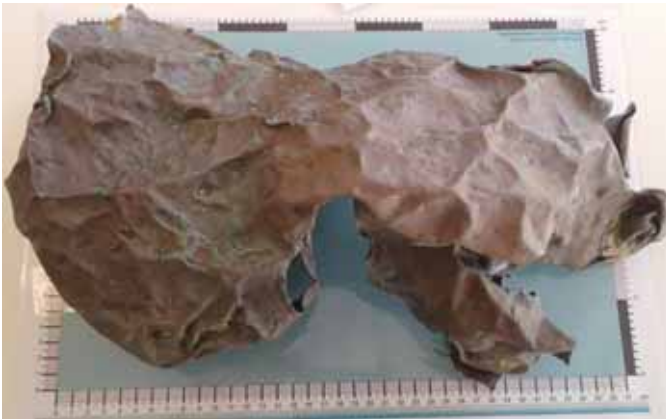
Though suggested by the finder to be a cribbage board, this find has the wrong layout and number of holes to be this, and is in fact the bristle-less remains of a broken scrubbing brush. Whether it was broken and lost its bristles before it entered the water is not clear. It probably dates from the 19th or early 20th century, though without any visible date or manufactures marks this can only be presumed.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck, or from material lost or thrown overboard during every day shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight



Tarmac_0774: Copper Tank

This crushed copper tank was discovered in Licence Area 351 in the South Coast dredging region, approximately 13 km south-east of the Isle of Wight. Rob Malloy discovered it on board the *City of Chichester*.

Tarmac_0774 appears to be the badly crushed and torn remains of a copper alloy fuel tank with what appears to be the heavily corroded and damaged sender and gauge point with the remnants of its mounting points visible. Though not fully clear in the images there also appears to be the rounded edges of another entry hole visible.

Copper alloy tanks are still found in older yachts and motor launches, and it may be that this tank has been removed from one of these and discarded due to damage or corrosion; or possibly through the loss of the vessel, either deliberately, accidentally or through enemy action if it were from a military launch. However, without any visible manufacture's marks or a date it difficult to date this item beyond stating that it is of 20th century origin and probably the mid to later part of that period.

How this object entered the maritime environment is not clear as it may have arrived via several routes, as discussed above. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight



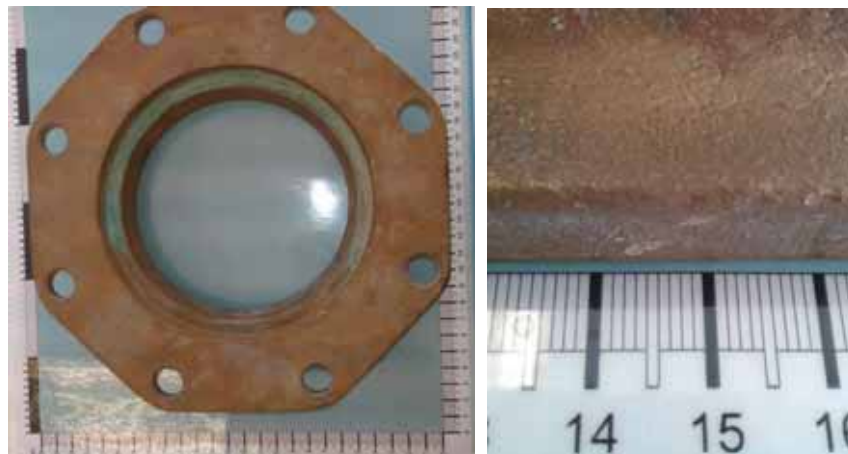
Tarmac_0775: Brass Flange

This brass flange was discovered in Licence Area 351 in the South Coast dredging region, approximately 13 km south-east of the Isle of Wight. Kevin Vine discovered it at Bedhampton Wharf from a cargo off the *Arco Dee*.

Tarmac_0775 is an octagon-shaped brass flange mounting 225 mm wide with a circular lipped pipe fitting with a 140 mm internal diameter, and eight mounting holes drilled through the edge. The object has a dent in one edge of the flange and patination from being submerged, but otherwise no other visible damage. A letter 'B' is stamped on the upper edge and there may also be another letter worn down and very faint alongside this one.

Marine engineer Anthony Mansfield suggests it is a compression ring for a packing gland. The 'packing' is grease impregnated woven cord which is compressed around a relatively slow speed shaft. In this case, it could be a propeller shaft due to the size or perhaps a very large water pump. The tell-tale is the bevelled face of the inner ring in the photographs.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck, or from material lost or thrown overboard during every day shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight



Tarmac_0776: Plated Spoon

This plated spoon was discovered in Licence Area 395/1 in the South Coast dredging region, approximately 12 km south-west of Selsey Bill. Dean Luttmann discovered it at Bedhampton Wharf in a cargo from the *City of Chichester*.

Tarmac_0776 is a silver-plated serving spoon with a maker's mark just visible through the patination and corrosion damage that has occurred as the metal has reacted with the sea water. The spoon is of the very common 'Old English' pattern, which unfortunately isn't very closely dated – it evolved in the mid-18th century and is still in use today; the use of silver-plating developing at the same time. This example isn't necessarily silver-plated, looking more like an example of mass-produced electro-plating from the 19th or 20th century. The mark on the back of the handle may therefore be a manufacturer's mark rather than a hallmark as these were not used on base metal.

Silver plating has been used since the 18th century to provide more affordable versions of household items that would have otherwise been made of solid silver, including cutlery, storage vessels, and decorative wears. The earliest form of silver plating was Sheffield Plate, where thin sheets of silver were fused to a base metal, this was followed in the 19th century by the development of new methods of production including electroplating. With the development of silver electroplating in 1840, Britannia metal, an alloy of tin, antimony and copper was developed as a base metal for silver plating and was widely used as the base metal for silver-plated household goods and cutlery in the UK. The UK assay offices, and silver dealers and collectors, use the term "silver plate" for items made from solid silver, derived long before silver plating was invented from the Spanish word for silver "plata", This can lead to confusion when discussing silver items; and whether they are plate or plated. In the UK, it is illegal to describe silver-plated items as "silver"; but not illegal to describe silver-plated items as "silver plate", although this is grammatically incorrect.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck, but more likely it was from material lost or thrown overboard during every day shipboard operations. Though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Records for the Isle of Wight & Chichester



Tarmac_0777: Lamp Bracket

This brass lamp or gimbal bracket was discovered in Licence Area 395/1 in the South Coast dredging region, approximately 12 km south-west of Selsey Bill. Dean Luttmann discovered it at Bedhampton Wharf in a cargo from the City of Chichester.

Tarmac_0777 appears to be the bracket for a swinging or gimballed reading or deck lamp. It is approximately 80 mm long and 60 mm wide with four screw holes through the long sides and two mounting loops on opposite corners. There is also what appears to be a hole through the corner of the bracket, and this may be a guide for the electrical lead or cable for the lamp bracket. With no marks or stamps visible the origins and purpose of this item is difficult to confirm; beyond that it is a ship's fitting of late 19th or early 20th century origin.

How this object entered the maritime environment is not clear as it may have arrived via several routes. This may include an unknown wreck, or from material lost or thrown overboard during every day shipboard operations. Therefore, though considered an isolated find, further finds of this type should be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Chichester and the Isle of Wight



Tarmac_0779: Porthole Ring

This brass porthole ring was discovered in Licence Area 395/1 in the South Coast dredging region, approximately 12 km south-west of Selsey Bill. Weedon discovered it at Shoreham Wharf.

Tarmac_0779 is the remains of a brass porthole ring. The remains do not include the second frame that would have been hinged to the remaining frame and would have contained the glass or the deadlight (a metal plate that was both a curtain and a reinforcement against heavy seas). This porthole ring has an internal diameter of 260 mm.

Portholes have been used for centuries to allow light and ventilation to enter the lower, darker levels of vessels and in some early cases, as a means of seeing out of a submersible. Portholes are watertight and are generally crafted from glass, secured within a metal frame that is then bolted to the vessel. The popular metals that are used to create the frame of the portholes are bronze and brass because these metals are less corrosive in saltwater. Modern types such as Tarmac_0779, appeared in 1863, where a hinged frame containing the glass would be attached along with the deadlight.

It is possible that this item entered the maritime environment from a wreck and due to the fracture damage evident from the photographs, may have been removed from the wreck site by salvagers. The second frame attached via a hinge has been broken off, possibly as a result of damage caused by a wrecking event or due to a diver removing the item from a wreck and taking the glass element. Equally, the damage could have been caused whilst the vessel was in harbour and the glass element was salvaged to be reused with another frame, whilst remains of the damaged frame were discarded in to the maritime environment.

References:

Stone, D.L., 1993. *The Wreck Diver's Guide to Sailing Ship Artifacts of the 19th Century*. Underwater Archaeological Society of British Columbia, Vancouver.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Chichester and the Isle of Wight.



Tarmac_0780: Pipe Coupler

This pipe coupler was discovered on the vessel *City of Chichester*. The dredging area it was from is unknown, however, it is likely to have been one of the south coast licensed areas.

Tarmac_0780 is a brass and copper pipe coupler that could have been used as an attachment for a water or fuel pipe. The copper pipe has been damaged, although whether this was prior to it entering the marine environment is unknown.

Brass and copper do not spark therefore the coupler could be related to fuel pipes, providing protection against fires and explosions aboard vessels. The wider end with the large thread (male end) has a series of holes around it to accommodate a spanner or key to tighten the thread into a possible pump housing or fuel tank. The other end has a female housing with large brass nut. This end possibly connected to a flexible hose or pipe. The centre section of copper pipe has soldered joints at both ends. This is a fairly weak joint and may have been designed as a 'sacrificial' element to give way under excessive pressure as a means of avoiding damage to the brass connectors. However, if the pipe was used for fuel, this would have posed a potential problem.

How it entered the maritime environment is not clear as the brass connectors seem to be intact. If there is a sacrificial element to the copper piping, then these connectors would have been recycled and attached to a new pipe should this fail. Therefore, it is unlikely that this would have been thrown overboard as waste material. It is therefore possible that this has entered the maritime environment from an unknown wreck site or was thrown overboard as an accident.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Isle of Wight and Chichester



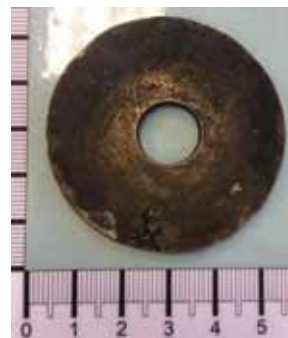
Tarmac_0782: Brass Ring

This brass ring was discovered in Licence Area 127 in the South Coast dredging region, approximately 13 km south, south east of Hengistbury Head. Aaron Harrigan discovered it at Southampton Wharf.

Tarmac_0782 is the remains of a brass ring. The find depicts the lettering "O.F. PP. SUCT. FROM BUNKERS". This ring has a diameter of 52 mm and an internal circular cut out with a diameter of 13 mm.

The 'SUCT.' is believed to be an abbreviation for suction however the O.F. and PP. abbreviations are unidentified. Bunker fuel or bunker crude is technically any type of fuel oil used aboard vessels. Bunkering is the supply of fuel for use by ships in a seaport. The term originated in the days of steamships, when the fuel, coal, was stored in bunkers. Nowadays the term 'bunker' is generally applied to the storage of petroleum products in tanks, and the practice and business of refuelling ships. It is therefore believed that this brass ring would have been associated with fuel bunkers.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. These include an unknown wreck site or from material lost or thrown overboard. Therefore, though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset



Tarmac_0783: Sleeve/Guard

This metal sleeve/guard was discovered in Licence Area 127 in the South Coast dredging region, approximately 13 km south, south east of Hengistbury Head. Jon Jerromes discovered it at Southampton Wharf.

Tarmac_0783 is believed to be a sleeve or guard of some sort. The find is made of metal and has a curved profile. The upper surface depicts a plate with numbers or letters on it possibly giving a model number or maker's name. The plate has been subjected to corrosion but it is possible to make out the faint remainder of a "3" and a "5" on the right side. The four holes on the upper surface are in two pairs with recessed head meaning that the head of the fixing, probably a screw was flush with the surface. The inside of the lower curved edge is chamfered. The back of the item has four holes that are larger and closer together.

Discussions with the experts have shed no light as to the function of this find. It has been noted that perhaps the holes on the back of the discovery were re-drilled as the original two were drilled in the wrong place. Neither end of the discovery appears to be snapped off or broken and it is possible wood was set in the groove and fixed via the front plate recessed screw holes.

Because this object is difficult to identify, how it entered the maritime environment is not clear. It may have come from an unknown wreck site or from material lost or thrown overboard during every day shipping operations. However, it may become clearer if the purpose of the find is later identified.



Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck The National Record of the Historic Environment
- The Historic Environment Record for Dorset.



Tarmac_0784: Cannonball

This cannonball was discovered in Licence Area 127 in the South Coast dredging region, approximately 13 km south, south east of Hengistbury Head. Jon Jerromes discovered it at Southampton Wharf.

Tarmac_0784 is a cast iron cannonball with a diameter of 140 mm or 5.5 inches. The find is most likely to be post-medieval in date and has been subjected to heavy corrosion in the marine environment.

Based on the material and the size of the cannonball, it is believed that it may have been fired from a Culverin; a smooth-bored brass gun with a long barrel used to bombard targets from a distance (Garrett 2010). Culverin was a class that included a range of different guns, however, the Culverin itself is the largest of this class with a 5.5 inch bore (Childs 2009). The Culverin weighed around 4,500 pounds and the shots fired from it would typically be between 17.5 and 18 pounds (Garrett 2010). These guns were used by the French in the 15th century, and later adapted for naval use by the English in Henry VIII's Royal Navy in 1546 (Childs 2009).

How this find entered the marine environment is unknown. It could be related to a period of post-medieval warfare at sea or have been lost overboard during shipping operations. Even though this cannonball is considered an isolated object, any further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References

Childs, D., 2009. *Tudor Sea Power: The Foundation of Greatness*. Seaforth Publishing, Barnsley.

Garrett, R. J., 2010. *The Defences of Macau: Forts, Ships and Weapons over 450 years*. Hong Kong University Press, Hong Kong.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset



Tarmac_0785: Winding Handle

This winding handle was discovered in Licence Area 395/1 in the South Coast dredging region, approximately 11 km south-west of Selsey Bill. Kevin Vine discovered it at Bedhampton Wharf.

Tarmac_0785 is described as a winding handle, otherwise known as a crank. The find is 560 mm long, 400 mm wide and is described as having a square hole in its end. The upper part of the handle is made of brass while the lower section is made of cast iron.

A hand crank may have many uses aboard a vessel, as the square end can lock on to any nut of the same size in order to be rotated. In earlier vessels, lifeboats were lowered in to the sea using removable hand cranks that could be attached to a pulley system and rotated to lower the boats and aid rescue. These have since been replaced by mechanically powered systems although cranks such as these can still be seen on board modern vessels. Cranks can be used in machine drives, manual pumps, and have other uses, and therefore it is difficult to establish what purpose this winding handle or hand crank served.

How this object entered the maritime environment is not clear as it may have arrived via several routes. These include an unknown wreck site; however it is probably more likely that the item was lost or thrown overboard during every day shipping operations. Therefore, though considered an isolated find, further finds of this type should continue to be reported.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for West Sussex



Tarmac_0786: Metal Spike

This threaded spike with nut was discovered in Licence Area 395/1 in the South Coast dredging region, approximately 11 km south-west of Selsey Bill. Gary Cooper discovered it at Bedhampton Wharf.

Tarmac_0786 is described as a metal spike with a nut and pin arrangement at the threaded thicker end. The find is 600 mm long, 100 mm thick and tapers at one end in to a point. The nut brings the total thickness at the larger end to 150 mm.

It has been suggested that this large object is a straight hay bale spear or tine used in agriculture to load and move hay bales. The tractor will have a square frame attached to the loader on to which each individual spear will attach. The number of spears attached to a single frame will depend on the size of the tractor and size of bales being moved. Each individual spear will slot in to a lubricated spear mounting tube and will be secured at the back of the frame with a threaded nut. A pin has been added to this example for added stability.

How this object entered the maritime environment is not clear as it may have arrived via several routes. If it is from a tractor, the find could have washed out of a terrestrial context, or, if it is determined to have a maritime use, then it is possible that it was lost or thrown overboard. There is a well evidenced spread of post-war debris in Licence area 395/1 in the South Coast region and well evidenced by Protocol finds. Although considered an isolated find, further finds of this type, or from this location, should continue to be reported.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for West Sussex



Tarmac_0787: Spanner

This spanner was discovered in Licence Area 351 in the South Coast dredging region, approximately 14 km south-west of Selsey Bill. Kevin Vine discovered it at Bedhampton Wharf.

Tarmac_0787 is a large open-ended spanner with a shaft that tapers to a sharper end, described by the finder as a spike. The discovery is 440 mm long and 90 mm at the larger end. The opening in the jaw measures 50 mm by 45 mm. There appears to be damage in the centre of the shaft in the form of a crack or split.

A spanner (or wrench) is a tool used to provide grip and mechanical advantage in applying torque to turn objects, usually rotary fasteners, such as nuts and bolts. A spanner with a U-shaped opening such as this one slides on to two opposite faces of the bolt or nut. The ends are generally oriented at an angle of around 15 degrees to the longitudinal axis of the handle. This allows a greater range of movement in enclosed spaces by flipping the wrench over. It wasn't until the late 18th century that spanners diversified in type and usage to include all the types we have today. With the onset of the Industrial Revolution, the wrought iron spanners made by blacksmiths were replaced with cast iron versions produced on a larger scale. Although spanners can date back to this date, this discovery is considered to be a modern find. Larger spanners such as this one are commonly associated with shipping vessels and are largely found on board ships or in areas where repairs are likely to take place, such as docks.

How this object entered the maritime environment is not clear as it may have arrived via several routes, however the most likely is that it was lost or thrown overboard during every day shipping operations. It also could have been purposely discarded overboard or from the dock as the shaft seems to have been damaged. Although considered an isolated find, further finds of this type should continue to be reported.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for West Sussex



CEMEX_0788: Water Pump

This water pump was discovered in Licence Area 340 in the South Coast dredging region, approximately 10 km south-east of the Isle of Wight. Ryszard Bartosiak discovered it on board *Sand Heron*.

CEMEX_0788 is a brass water pump from an engine cooling system measuring 200 mm by 150 mm. There is an inlet and an outlet attachment with threaded areas to attach pipes to the pump. The word "PATENT" is inscribed on the right-hand side of the object but no other markings or dates are present.

It has been established that CEMEX_0788 is a centrifugal water pump used as part of the engine cooling system found on maritime vessels. The "top" of the object would be connected to the engine via the two larger machine fit holes seen in the photographs. The two smaller holes at the "top" of the pump is where the bolts would have gone in order to secure the fitting to the engine. When the bolts were tightened, the connection to the engine was sealed and completely water tight. There is a pulley wheel in the central area that is turned by a belt. The two pipes at the "base" of the pump are inlet and outlet pipes. Sea water which would have been in abundance, would be pumped through the inlet pipe and circled around the engine as a means of cooling the components before being exhausted through the outlet pipe. The pump would supply a continuous flow of water to maintain temperatures consistent with the demanding engine performance. Curved vane centrifugal pumps were introduced by British inventor John Appold in 1851 and were adapted for use on steamships from this date onwards (Ellis, 1851).

How this object entered the maritime environment is not clear as it may have arrived via several routes. These include an unknown wreck site or from material lost or thrown overboard during every day shipping operations. The water pump does not appear to be damaged on the exterior surface but it may have ceased to work and thus possibly dumped. Though considered an isolated find, further finds of this type should continue to be reported.

Reference

Ellis, R., 1851. *Index and introductory. Raw materials. Machinery.-v.2. Manufactures. Fine arts. Colonies.-v.3 Foreign states.* Spicer Brothers, London

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 087/17)
- The National Record of the Historic Environment
- The Historic Environment Record for the Isle of Wight



CEMEX_0789: Knife Blade



This knife blade was discovered in Licence Area 512 in the East Coast dredging region, approximately 17 km south-east of Great Yarmouth. D. Trowbridge discovered it at Dagenham Wharf.

CEMEX_0789 is an iron knife blade measuring 275 mm long and 30 mm wide. It was found attached to the magnet at Dagenham Wharf. The blade is that of a fixed blade knife, sometimes called a sheath knife, as it does not fold or slide, and is typically stronger due to the tang, the extension of the blade into the handle, and lack of moving parts.

The blade is broken along its sharpest edge but it is unclear whether this was broken before entering the marine environment or due to corrosion processes on the seabed. The knife is also missing its handle. It is possible that if the handle of the blade was made of an organic material such as wood or bone, it has been eroded away and become detached from the blade at some stage. Another possibility is that the blade was discarded in to the sea without its handle due to being broken. The knife blade does not bear any makers marks therefore it is difficult to date such an object. The level of preservation is relatively good despite the missing handle but this may not determine the age of the object as it may have been buried and therefore better preserved. Due to the style of this blade, this example could date to the post-medieval period. However, the slight curve at the tip of the blade may indicate a more modern knife, used during fishing operations to cut upwards through netting or rope.

How this find entered the marine environment is not clear. The most likely explanation is that it was lost overboard during shipping operations or was discarded at sea due to being broken. Although considered an isolated find, further finds of this type should continue to be reported.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck (Droit 088/17)
- The National Record of the Historic Environment
- The Historic Environment Record for Norfolk



Tarmac_0790: Cannonball

This cannonball was discovered in Licence Area 395/1 in the South Coast dredging region, approximately 11 km south-west of Selsey Bill. Gary Cooper discovered it at Bedhampton Wharf.

Tarmac_0790 is a cast iron cannonball with a diameter of 130 mm or 5 inches. No weight was given. Cannonballs or round shot are one of the earliest forms of projectiles fired from cannons. Round shot was made in early times from dressed stone and from iron by the late 15th century until the early 19th century. Dating with any accuracy is extremely difficult as cannonballs did not alter much in their construction over hundreds of years. Based on the diameter alone, this cannonball could have been fired by either a culverin, if it is an early example, or an 18 pounder, if it is a later example.

A Culverin is a smooth-bored brass gun with a long barrel used to bombard targets from a distance (Garrett 2010). Culverin was a class that included a range of different guns, however, the Culverin itself is the largest of this class (Childs 2009) and fires shots ranging from 4¾ inches up to 5.5 inches (Museum of Artillery). The Culverin weighed around 4,500 pounds and the shots fired from it would typically be between 17.5 and 18 pounds (Garrett 2010). These guns were used by the French in the 15th century, and later adapted for naval use by the English in Henry VIII's Royal Navy in 1546 (Childs 2009). Eighteen pounders are a standardised version of the same cannon with a change of name following the standardization of artillery sizes by the British Board of Ordnance in 1716. Rather than refer to them by the various names that the different cannon variations had had up to this time, they were standardized to the weight of round ball that they fired, rounded up to the nearest pound of the commonest weights (Carpenter 1993).

Licence Area 395/1 is known for the discovery of cannonballs, including isolated cannonballs (UMA_0199, LTM_0518 & Tarmac_0673). This is unsurprising given that the English Channel has been the site of many battles and minor conflicts for hundreds of years. Finds of cannonballs on the seabed, even individual cannonballs, can be indicative of the location of a battle or a previously unrecorded shipwreck. Even though this cannonball is considered an isolated object, any further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References

- Childs, D., 2009. *Tudor Sea Power: The Foundation of Greatness*. Seaforth Publishing, Barnsley.
- Garrett, R. J., 2010. *The Defences of Macau: Forts, Ships and Weapons over 450 years*. Hong Kong University Press, Hong Kong.
- Carpenter, A.C., 1993. *Cannon: The Conservation, Reconstruction and Presentation of Historic Artillery*. Halsgrove Press, Tiverton.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset.





Britannia_0791: Mammoth Tooth

This Mammoth tooth was discovered at Cliffe Wharf in Kent and most likely comes from the South Coast dredging region.

Britannia 0791 is a whole mammoth tooth discovered at Cliffe Wharf in Kent, measuring 160 mm by 140 mm.

Images of the find were sent to experts at the Natural History Museum for further identification. Dr Adrian Lister viewed the photos and concluded that this example is a complete left lower first molar of an adolescent woolly mammoth. *Mammuthus primigenius* or woolly mammoth were in existence in Europe during the late Middle and Late Pleistocene, dating from 350,000 to 10,000 thousand years ago (Lister and Sher 2001). European mammoths have conventionally been divided into three species: the Early Pleistocene *Mammuthus meridionalis* (2.6 to 0.7 million years ago), the early Middle Pleistocene *Mammuthus trogontherii* (0.7 to 0.5 million years ago), and the woolly mammoth, *Mammuthus primigenius* (Lister and Sher 2001) which disappeared from Britain around 14,000 years ago (<http://news.bbc.co.uk/1/hi/sci/tech/8106090.stm> accessed 12/07/17). Important changes can be seen in the teeth of the mammoths as each species evolves; there is an increase in the number of enamel bands (plates) in the molars, and thinning of the enamel. The dental changes resulted in increased resistance to abrasion, which is believed to indicate a shift from woodland browsing to grazing in open grassy habitats of the Pleistocene.

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. 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 (<http://ets.wessexarch.co.uk/recs/humber/archaeology/> accessed 12/07/17). 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.

References

Lister, A. M and Sher, A. V., 2001. The Origin and Evolution of the Woolly Mammoth. Science (volume 294).

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The National Record of the Historic Environment
- The Historic Environment Record for Kent





CEMEX_0792: Mammoth Tooth

This mammoth tooth was discovered at Northfleet Wharf in Kent and most likely comes from the South Coast dredging region.

Cemex 0792 was identified as a portion of mammoth tooth, discovered at Northfleet Wharf in Kent, measuring 140 mm by 80 mm.

Images of the find were sent to experts at the Natural History Museum for further identification. Dr Adrian Lister viewed the photos and concluded that this example is a small part of an upper molar (probably second or third) of a mammoth or elephant species. The occlusal surface of the tooth would be needed to judge the species however, the relevant parts aren't visible on this specimen.

The remains of mammoths or elephant species 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. 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 (<http://ets.wessexarch.co.uk/recs/humber/archaeology/> accessed 12/07/17). 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.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The National Record of the Historic Environment
- The Historic Environment Record for Kent





CEMEX_0794: Animal Bone

This mineralised animal bone was discovered at Northfleet Wharf in Kent and most likely comes from the South Coast dredging region.

CEMEX_0794 is a fragment of large fossilized or mineralised animal bone measuring 230 mm by 170 mm. Mineralised bone means that the bone has been in the ground for a long period of time and that mineral-laden waters have percolated through the porous material, saturating it with mineral deposits. It is then petrified and will become much heavier and robust than it originally was. It almost takes on the appearance and characteristic of stone. The quicker the process of petrification, the better chance the bone has of surviving.

Images of the find were sent to experts at the Natural History Museum for further identification. Dr Adrian Lister viewed the photos and concluded that this example may be a fragment of the mandible (lower jaw) of a mammoth. Lorrain Higbee, the animal remains expert at Wessex Archaeology examined the find and determined that it is possibly the centre point of a mammoth jaw where both halves meet. European mammoths have conventionally been divided into three species: the Early Pleistocene *Mammuthus meridionalis* (2.6 to 0.7 million years ago), the early Middle Pleistocene *Mammuthus trogontherii* (0.7 to 0.5 million years ago), and the late Middle to Late Pleistocene woolly mammoth, *Mammuthus primigenius* (350,000 to 10,000 thousand years ago) (Lister and Sher 2001). The woolly mammoth is thought to have disappeared from Britain around 14,000 years ago (<http://news.bbc.co.uk/1/hi/sci/tech/8106090.stm> accessed 12/07/17). It is difficult to ascertain species from fragments such as CEMEX_0794.

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. 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 (<http://ets.wessexarch.co.uk/recs/humber/archaeology/> accessed 12/07/17). 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.



CEMEX_0795: Animal Bone

This animal bone was discovered at Northfleet Wharf in Kent and most likely comes from the South Coast dredging region.

CEMEX_0795 is a fragment of large fossilized or mineralised animal bone measuring 240 mm by 120 mm. Mineralised bone means that the bone has been percolated by mineral-laden waters and saturated. Over time, it becomes petrified and will become much heavier and robust than it originally was, almost appearing as if made of stone. The remains of marine concretion are visible on the fragment where the bone has been in contact with the sea bed for a long period.

Images of the find were sent to experts at the Natural History Museum for further identification. Dr Adrian Lister viewed the photos and concluded that this example is most likely a fragment of a limb bone shaft of a large mammal, possibly a tibia, belonging to a mammoth or woolly rhino. Lorrain Higbee, our animal remains expert at Wessex Archaeology examined the finds and determined that the find is indeed the tibia due to the angles displayed by the fragment and would most likely belong to a mammoth.

Woolly Rhinoceros or *Coelodonta antiquitatis* was a large animal exceeding 2 tonnes, adapted to feeding on low-growing herbaceous vegetation and a dry climate with minimal snowfall. The large bulk of the body and short legs, lacking spreading hooves or pads, indicate an animal unable to travel well in deep snow. The woolly rhinoceros has been widely regarded as having been a 'fellow traveller' of the woolly mammoth *Mammuthus primigenius*, as their remains commonly occur together in deposits. Woolly rhinoceros disappeared from Britain around 35 000 years ago. The final extinction of the woolly rhinoceros around 13 900 years ago probably relates to a period of warming and increased precipitation (especially snowfall) accompanied by the replacement of low-growing herbaceous vegetation by shrubs and trees during the Lateglacial.

European mammoths have conventionally been divided into three species: the Early Pleistocene *Mammuthus meridionalis* (2.6 to 0.7 million years ago), the early Middle Pleistocene *Mammuthus trogontherii* (0.7 to 0.5 million years ago), and the late Middle to Late Pleistocene woolly mammoth, *Mammuthus primigenius* (350,000 to 10,000 thousand years ago) (Lister and Sher 2001). The woolly mammoth is thought to have disappeared from Britain around 14,000 years ago (<http://news.bbc.co.uk/1/hi/sci/tech/8106090.stm> accessed 12/07/17). It is difficult to ascertain the exact species from fragments such as CEMEX_0795.

The remains of mammoth or woolly rhino may date to a time when the seabed was dry land. During the last 2.5 million years, known as the Pleistocene, 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 (<http://ets.wessexarch.co.uk/recs/humber/archaeology/> accessed 12/07/17). 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.

References

Lister, A. M and Sher, A. V., 2001. The Origin and Evolution of the Woolly Mammoth. *Science*. (volume 294).

McNamara, K and Murray, P., 2010. *Prehistoric Mammals*. Western Australian Museum

Stuart, A. J and Lister, A. M., 2012. Extinction chronology of the woolly rhinoceros *Coelodonta antiquitatis* in the context of late Quaternary megafaunal extinctions in northern Eurasia. *Quaternary Science Reviews*. (volume 51).

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The National Record of the Historic Environment
- The Historic Environment Record for Kent



References

Lister, A. M and Sher, A. V., 2001. The Origin and Evolution of the Woolly Mammoth. Science (volume 294).

McNamara, K and Murray, P., 2010. *Prehistoric Mammals*. Western Australian Museum

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The National Record of the Historic Environment
- The Historic Environment Record for Kent





CEMEX_0796: Pulley wheel

This Pulley wheel was discovered in the cargo of *Sand Heron* from Licence Area 137 in the South Coast dredging region, approximately 9 km south-west of the Isle of Wight. Steve Bomber discovered it at Leamouth Wharf.

CEMEX_0796 is a cast iron ring that depicts no markings, and was reported as a pulley wheel. This ring has a diameter of 120 mm and an internal circular cut out with a diameter of 30 mm. The ring is approximately 45 mm thick and weighs 1.6 kg. The ring has been subjected to corrosion in the marine environment as the surfaces and the rim of the wheel is seen to be uneven.

Research has confirmed that CEMEX_0796 is most likely a flat belt pulley wheel commonly seen on industrial and agricultural machinery. In a belt drive, a belt connects one or more pulleys also called wheels or sheaves. The surface of a flat belt pulley wheel has to be smooth, otherwise the slip in the belt causes the wear to become too great. Pulley for flat belts are usually made of cast iron, steel, light alloy or plastic while belts are usually made of rubber, polyurethane or leather. The rim seen on this pulley wheel may have existed in order to provide a flush seal to the object that was laid against it. The hole in the centre would have accommodates the axle or shaft.

This object may have entered the maritime environment via a number of routes. These include an unknown wreck site or from material lost or thrown overboard during every day shipping operations. Though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.

References

- Dean, T., 2009. *The Human-Powered Home: Choosing Muscles Over Motors*. New Society Publishers, Canada.
- Jayendran, A., 2007. *Mechanical Engineering: Grundlagen des Maschinenbaus in englischer Sprache*. Springer Science & Business Media, Berlin.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight





Britannia_0797: Scissors

These scissors were discovered at West Bank Terminal in Ipswich port. The license area they come from is unknown but they most likely come from the south coast dredging region.

Britannia_0797 are a pair of metal scissors measuring 130 mm by 120 mm. The scissors are badly damaged, missing the tips of the blades and one handle. Whether this damage occurred before or after entering the marine environment is unknown, however, the metal has been subjected to corrosion as the surface is heavily pitted. They are believed to be modern in date.

Due to the size of the bows on the handles, it is possible that these scissors are hair-cutting scissors or barber's shears. These types of scissors are usually significantly sharper than regular scissors, and designed specifically for cutting hair. The blades tend to be flat and the shanks straight. Additionally, they commonly have a tang, known as a finger rest (sometimes called a cockade), attached to one of the finger rings that gives the user additional control when cutting. Based on images of similar hair-cutting shears, if a tang was present on this pair, it would appear to have been on the finger ring that is missing from this specific pair.

This object may have entered the maritime environment via a number of routes. These include an unknown wreck site or from material lost or thrown overboard during every day shipping operations. Alternatively, they could have been discarded from a dock. Though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Reference:

Beaudry, M. C., 2006. Findings: *The Material Culture of Needlework and Sewing*. Yale University Press, New Haven.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Suffolk



CEMEX_0799: Door handle

This door handle was discovered at Northfleet Wharf in Kent. The license area it comes from is unknown but it most likely comes from the South Coast dredging region.

CEMEX_0799 is a metal watertight door or hatch handle known on marine vessels as a door dog. The object is approximately 190 mm in length and 30 mm in width with a 15 mm hole to accommodate the fastening that attaches the dog to the handle on the other side of the door. The lever has been subjected to corrosion in the marine environment as the surface of the metal is severely pitted.

The most common hatch or door on a vessel is closed by means of double clips and wedges (dogs) which are operable from either side of the door. When the door is closed, a knife edge on the door fits against a rubber gasket on the bulkhead. The door is secured in the closed position by hinged levers called dogs as can be seen on the image to the right. There are usually several dogs for one door and when they are hand tightened they cause a watertight seal. The phrase 'to dog the door' is a mariner's term for sealing a watertight door or hatch.



This object may have entered the marine environment via a number of routes. The item is not broken and therefore could be indicative of an unknown wreck site or from material lost or thrown overboard during every day shipping operations. Alternatively, it could have been discarded from a dock. Though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.

References

- House, D. J., 2004. *Seamanship Techniques: For Shipboard & Maritime Operations* (Third Edition). Routledge, New York
- Maritime Training Advisory Board (U.S.), 1994. *Marine Fire Prevention, Firefighting and Fire Safety: A Comprehensive Training and Reference Manual*. DIANE Publishing, Pennsylvania
- Edwards, J., 2006. *Torpedo*. iUniverse, Bloomington

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Kent



CEMEX_0800: Decorative Iron Objects

These decorative iron objects were discovered at Northfleet Wharf in Kent. The license areas they come from is unknown but they most likely come from the south coast dredging region.

These two cast iron objects are identical in design and were found as a pair. Each one measures 50 mm long, 40 mm high and 30 mm thick, has a 10 mm wide hole cut out in its base and a 10 mm wide hole running its length. The holes in each base meant that they possibly sat atop some sort of poles and the holes running their length possibly means that they were once connected to each other.

It is believed that these decorative objects may be finials that would have topped iron railings. Railings often include vertical rods, horizontal bars and decorative finials that would account for the holes in our objects. Due to the objects being made of cast iron, it is possible that the railings themselves were made from the same material. However, records show that a combination of both cast and wrought iron could be used to produce the same railings, with the wrought iron being frequently used to glaze bars in order to provide tensile strength. Cast iron railings are more prone to rusting and is hard and brittle in comparison to wrought iron railings but are much cheaper to make. One of the earliest uses of cast iron railings in England was in 1710–14 at St Paul's Cathedral. They were made at the Lamberhurst Foundry in Sussex at a cost of £11,202. Other early uses of cast iron railings were at Cambridge Senate House and at St Martin's-in-the-Fields, London.

This object may have entered the marine environment via a number of routes. The item could have been lost or thrown overboard during every day shipping operations. Alternatively, it could have been discarded from a dock. During the last century, many railings were removed from public parts in order to be used as scrap iron for the war effort and could account for the loss of these finials. Though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of a debris field.

References

- Chessell, A., 2010. *Coldstream Building Snippets: 'cans, Quoins and Coursers'*. Lulu.com
Fieldhouse, K and Woudstra, J., 2012. *The Regeneration of Public Parks*. Oxford, Taylor & Francis.
Straker, E. 1931. *Wealden Iron*. London, G. Bell & Sons Ltd.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Kent



CEMEX_0801: Shell

This shell was discovered in the cargo of *City of Chichester* from Licence Area 137 in the South Coast dredging region, approximately 9 km south-west of the Isle of Wight. Steve Bomber discovered it at Leamouth Wharf. The shell was disposed of by the EOD.

CEMEX_0801 is a shell that measures approximately 25 cm in length and 9 cm in diameter. There is a single copper drive band on the shell with characteristic angled notches around the circumference (seen to the left of the image). These notches form as a result of the copper drive band engaging with the rifling of the gun barrel, the motion of which in turn, puts the spin on the projectile as it is fired. Due to the presence of these notches, we can tell that this shell has been fired in the past. The obturating ring or drive band serves two purposes; it enables the projectile to travel a further distance and to strike with a greater deal of accuracy and also creates a seal between the shell and the breech of the gun firing it, trapping propellant gases behind to ensure efficient firing.

Images of the find were sent to Phil Magrath, the artillery curator at the Royal Armouries Museum in Leeds, Trevor Parker of the Ordnance society and our in-house specialist, Bob Davis. All the specialists were uncertain as to which gun it was fired from as there are no markings left and the calibre can only be estimated from the photographs as approximately 3.5 inches or 85 mm. A piece of information which would help to confirm this is the number of rifling grooves in the gun. This equates to the number of raised ridges around the copper driving band round the base of the shell. They agreed that the shell looks like an armour piercing (AP) with internal charge and base fuze. That is to say that the fuze is in the base rather than on the tip. One specialist suggested the shell may have come from a 3 inch 20 cwt gun while another suggested it may possibly come from a 25 pdr Field Gun Solid Shot. Again, the number of rifling grooves on the copper band would help to prove or disprove this.

The find was reported to the police and removed from site by the Explosive Ordnance Disposal team. Finds like this one are not uncommon offshore and staff in the aggregate industry have been trained to recognise and report them for their safety. Unexploded ordnance (UXO) pose a significant risk as degradation of the detonator or fuse can render them unstable and an impact could potentially detonate the device. Most ordnance found in British waters relates to the First or Second World War meaning that unexploded ordnance could have lain undisturbed for 70-100 years.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire and the Isle of Wight



CEMEX_0802: Cannon Shells

These two cannon shells were dredged in Licence Area 137 in the South Coast dredging region, approximately 10 km south of the Needles. Steve Bomber discovered them on Leamouth Wharf, in a cargo from the *Sand Heron*.

These two heavily corroded and damaged cannon shells are 70 and 80 mm long with one of them having the remains of a copper driving band, showing evidence of being fired. Both are approximately 18-20 mm in diameter. The degree of damage, corrosion and truncation that these two cannon shells have suffered makes a definitive identification difficult. The presumption is that they are of German origin, however, it is also possible that they are armour piercing 20 mm Hispano shells, and therefore of British origin. In either case they are from aircraft mounted guns.

Their construction and approximate length points to them being Minengeschoss ('mine-shell'), a high-capacity autocannon ammunition originally developed in Germany and used in the Luftwaffe's larger calibre aircraft armament during the Second World War. This new type of high-explosive (H.E.) shell differed from conventional H.E. ammunition in that it had much thinner walls. The shell was drawn from high-quality steel, instead of having the explosives cavity drilled into a solid shot, which allowed thinner-wall construction and therefore a far greater amount of explosive filler. It was used, amongst others, in the Luftwaffe's 20 mm MG FF/M and MG 151/20 cannon and first used in combat during the Battle of Britain in 1940 by the Luftwaffe's Bf 109E and Bf 110C fighters. The 20 mm M-Geschoss shell (used in M151/20 and MG-FF/M cannons - the same shell was used in both cartridges) had an 18 g HE filling while the typical filler load in 20 mm shells at the time was 6 to 10 g.

It is unknown how exactly these two items entered the offshore archaeological record, the most likely explanation is during some form of aerial combat or during anti-ship operations during the Second World War, though it is also possible that they are the result of trials on captured aircraft or weapons.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Hampshire & The Isle of Wight



WARG_0803: Pieces of Metal

These three pieces of metal were discovered in the South Coast dredging region, approximately 16 km east of the Isle of Wight. Ellie Maher, of Marine Ecological Surveys Ltd, discovered them on board during a survey.

These three pieces of metal were recovered from the seabed whilst an ecological survey of the south coast was being undertaken for the South Coast Dredging Association. The larger piece, measuring approximately 400 mm by 400 mm, was found with a piece of knotted rope around it. Whether the rope is associated with the items is unclear. One of the smaller pieces (200 mm by 70 mm) is a thin piece of copper, associated with the larger piece, as the same material can be seen attached to the outside. The second smaller piece (140 mm by 50 mm) appears to be a handle, and is also thought to be associated with the larger object as the remaining handle still attached is of identical shape and size. All the pieces are believed to be brass due to the green hue that is visible due to the marine environment.

The larger object is believed to be a deck hatch or deck plate that admits light or access to the spaces below deck. The moulded rim of the hatch is still visible on the outside of the large square shape where it would have sat on a hole in the deck and provided a waterproof seal. Both handles would have been attached in order to lift it. It is thought that a glass panel would have initially been secured in the opening although whether this was broken or missing before entering the marine environment is unclear. It is also not clear how the hatch would have been secured once closed as there does not seem to be any fixtures or fittings attached to the inside. Suggestions were also made that this object may be related to an ammunition storage box based on the design and the material it is made from.

How this object entered the maritime environment is not clear as it may have arrived via a number of routes. It is possible that this item entered the maritime environment from a wreck and due to the fracture damage evident from the photographs, and it may have been removed from the wreck site by salvagers. Equally, the finds could have been material lost or thrown overboard during every day shipping operations. Therefore, though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for the Isle of Wight



Tarmac_0805 Cannonball

This cannonball was discovered in Licence Area 509/2 in the Thames Estuary dredging region, approximately 23 km south-east of Harwich harbour. A. Ambury discovered it on board *City of London*.

Tarmac_0805 is a cast iron cannonball described as having a diameter of 120 mm or 4.7 inches. No weight was given. It has been heavily degraded in the marine environment resulting in a loss of shape. Cannonballs or round shot are one of the earliest forms of projectiles fired from cannons. Round shots were made from iron by the late 15th century until the early 19th century. Dating with any accuracy is extremely difficult as cannonballs did not alter much in their construction over hundreds of years. Based on the diameter alone, this cannonball could have been fired by either a culverin, if it is an early example, or an 18 pounder, if it is a later example.

A Culverin is a smooth-bored brass gun with a long barrel used to bombard targets from a distance (Garrett 2010). Culverin was a class that included a range of different guns, however, the Culverin itself is the largest of this class (Childs 2009) and fired shots ranging from 4¾ inches up to 5½ inches (Museum of Artillery). These guns were used by the French in the 15th century, and later adapted for naval use by the English in Henry VIII's Royal Navy in 1546 (Childs 2009). Eighteen pounders are a standardised version of the same cannon with a change of name following the standardization of artillery sizes by the British Board of Ordnance in 1716. Rather than refer to them by the various names, they were standardized to the weight of round ball that they fired, rounded up to the nearest pound of the commonest weights (Carpenter 1993).

Finds of cannonballs on the seabed, even individual cannonballs, can be indicative of the location of a battle or a previously unrecorded shipwreck. Even though this cannonball is considered an isolated object, any further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References

- Childs, D., 2009. *Tudor Sea Power: The Foundation of Greatness*. Seaforth Publishing, Barnsley.
- Garrett, R. J., 2010. *The Defences of Macau: Forts, Ships and Weapons over 450 years*. Hong Kong University Press, Hong Kong.
- Carpenter, A.C., 1993. *Cannon: The Conservation, Reconstruction and Presentation of Historic Artillery*. Halsgrove Press, Tiverton.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Essex



Tarmac_0806: Fossil

This fossil was discovered in Licence Area 509/2 in the Thames Estuary dredging region, approximately 23 km south-east of Harwich harbour. Paul Scrace discovered it at Greenwich Wharf.

Tarmac_0806 appears to be a small fossilised spiral of an ammonite, a prehistoric invertebrate animal that lived in marine environments millions of years ago. The fossil appears to be encased either side in stone and therefore only a section of its ridged shell is visible. The find is approximately 80 mm by 60 mm.

Ammonites are extinct marine invertebrates. They are of the lineage of cephalopods which also include octopus, squid, cuttlefish and nautiloids. The smallest adult sized ammonites were about 1-2 cm across the spiral with the largest on record exceeding 1.5 m (Fzy and Szente 2014). Most have a planispiral flat coil but others had straight shells or loosely coiled spirals. The shell was made up of successive chambers that were connected together via a tube. Using this tube, the ammonite was able to control the relative proportions of liquid and gas inside its shell and thus its buoyancy (Fzy and Szente 2014). The shell of the cephalopods suggests that they could swim but not very well. Ammonites finally went extinct around 65 million years ago, at the end of the Mesozoic era along with the dinosaurs (Fzy and Szente 2014). Ammonites inhabited the open sea and so their fossils can be discovered in a vast number of area.

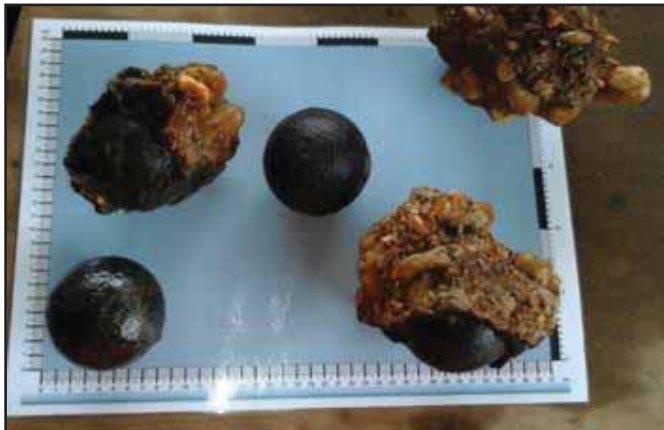
Fossils are not strictly speaking archaeology, as archaeology only concerns the human past, which in the UK is broadly understood to be the last 900,000 years. However, there is evidence that, just as people collect fossils today, people in the past valued fossils, for example as jewellery, ornaments or curiosities so it is important that all further finds of a similar nature are reported through the Protocol.

References

Fzy, I and Szente, I., 2014. *Fossils of the Carpathian Region*. Indiana University Press, Indiana

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate



Tarmac_0807: 5 Cannonballs

These cannonballs were discovered in Licence Area 127 in the South Coast dredging region, approximately 13 km south, south east of Hengistbury Head. Aaron Harrigan discovered them at Burnley Southampton Wharf.

Tarmac_0807 is a collection of five cast iron cannonballs with an approximate diameter of 3 inches. Three of the cannonballs are encased in a thick concretion.

Based on the material and the size of the cannonballs, it is believed that they may have been fired from a minion; a small brass cannon with small bore that would typically fire a 4 lb shot (Garrett 2010). This small cannon was used from the Tudor period up until the 17th century, therefore dating the cannonball itself is difficult. The minion features heavily in the Elizabethan Navy and is associated famously with the vessel *Context*, that managed to keep three ships and two galleons at bay using only one minion, one saker and one falcon in 1591 (Childs 2009). This type of cannon was also used in the English Civil War (1642-1651) where it is recorded as having a weight of 1200 lbs (Bull 2008). Eight minions also made up the armament of the famous ship, *Mayflower*, that carried pilgrims from Plymouth to the New World in 1620 (Bradford 1952).

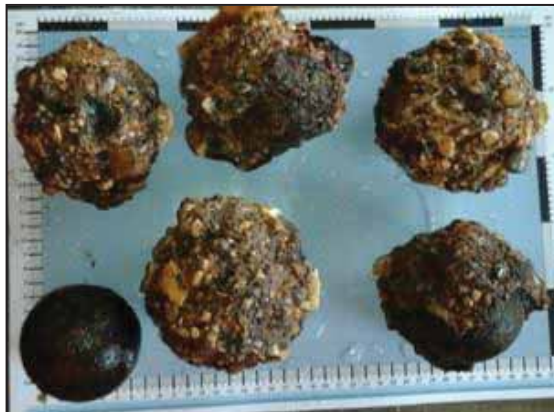
How these finds entered the marine environment is unknown. They could be related to a period of post-medieval warfare at sea or have been lost overboard during shipping operations. A collection of cannonballs can be indicative of the location of a battle or a previously unrecorded shipwreck and a few have been recorded in License Area 127. Further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References

- Bradford, W., 1952. *Of Plymouth Plantation, 1620-1647*. Rutgers University Press, New Jersey.
- Bull, S., 2008. *'The Furie of the Ordnance': Artillery in the English Civil Wars*. Boydell & Brewer Ltd, Martlesham
- Childs, D., 2009. *Tudor Sea Power: The Foundation of Greatness*. Seaforth Publishing, Barnsley.
- Garrett, R. J., 2010. *The Defences of Macau: Forts, Ships and Weapons over 450 years*. Hong Kong University Press, Hong Kong.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset



Tarmac_0808: 15 Cannonballs

These cannonballs were discovered in Licence Area 127 in the South Coast dredging region, approximately 13 km south, south east of Hengistbury Head. Jon Jerromes discovered them at Burnley Southampton Wharf.

Tarmac_0808 is a collection of 15 cast iron cannonballs, with an approximate diameter of 3 inches with various level of concretion. An inch-thick layer of concretion is visible on some of the cannonballs where oxides from the cast iron has combined with minerals and sediments to form a large block of concretion (Smith 2003). Cast iron, because of its high carbon content forms a concretion that moulds to its actual shape. Some of the cannonballs are completely encased in concretion whilst others are only partially covered.

Based on the material and the size of the cannonball, it is believed that it may have been fired from a minion; a small brass cannon with small bore that would typically fire a 4 lb shot (Garrett 2010). This small cannon was used from the Tudor period up until the 17th century, therefore dating the cannonball itself is difficult. The minion features heavily in the Elizabethan Navy and is associated famously with the vessel *Context*, that managed to keep three ships and two galleons at bay using only one minion, one saker and one falcon in 1591 (Childs 2009). This type of cannon was also used in the English Civil War (1642-1651) where it is recorded as having a weight of 1200 lbs (Bull 2008). Eight minions also made up the armament of the famous ship, *Mayflower*, that carried pilgrims from Plymouth to the New World in 1620 (Bradford 1952).

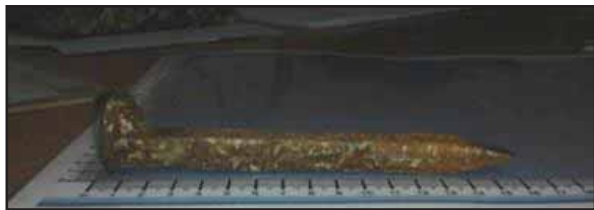
A collection of cannonballs can be indicative of the location of a battle or a previously unrecorded shipwreck. Cannonballs have been previously found in License Area 127 which may be indicative of an area associated with naval warfare. Further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References

- Bradford, W., 1952. *Of Plymouth Plantation, 1620-1647*. Rutgers University Press, New Jersey.
- Bull, S., 2008. *'The Furie of the Ordnance': Artillery in the English Civil Wars*. Boydell & Brewer Ltd, Martlesham
- Childs, D., 2009. *Tudor Sea Power: The Foundation of Greatness*. Seaforth Publishing, Barnsley.
- Garrett, R. J., 2010. *The Defences of Macau: Forts, Ships and Weapons over 450 years*. Hong Kong University Press, Hong Kong.
- Smith, C. W., 2003. *Archaeological Conservation Using Polymers: Practical Applications for Organic Artifact Stabilization*. Texas A&M University Press, Texas.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset



Tarmac_0809: Iron Fastening

This iron fastening was discovered in Licence Area 127 in the South Coast dredging region, approximately 13 km south, south east of Hengistbury Head. Jon Jerromes discovered it at Burnley Southampton Wharf.

Tarmac_0809 is an iron fastening, approximately 160 mm in length, with a shank diameter of around 20 mm. The fastening is hooked slightly on the top or head.

There are some difficulties in correctly identifying fastening types as terms used can vary between countries and industries. The fastening was initially thought to be a ship's nail associated with ship building. The general convention for shipbuilding is that those with a square section are labelled 'spikes' while the more rounded are 'nails', different versions of these types are then based on the shape of the head. The term 'spike' can also be applied to large nails. After research, it is thought that perhaps the find could be a rail spike (also known as a cut spike or crampon), a large nail with an offset head that is used to secure rails and base plates to railroad ties (sleepers) in the track (Hay 1953). A rail spike is roughly chisel-shaped and with a flat edged point; the spike is driven with the edge perpendicular to the grain, which gives greater resistance to loosening (Hay 1953). The first recorded use of a rail spike was in 1832 therefore this example may date from this period.

Similar fastenings have previously been recovered from License Area 127 (Tarmac_0315 and Tarmac_0397) therefore although considered an isolated find, further finds of this nature should be reported. Large numbers of fastenings in a single area could indicate the presence of a shipwreck where the wooden timbers have rotten away. However, they may also relate to the construction industry and may have been lost from a ship cargo. Alternatively, they may be form a refuse possibly located in this area.

References

Hay, W. W., 1953. *Railroad Engineering*, Volume 1. John Wiley & Sons, New York.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset



Tarmac_0810: Wood

These waterlogged wood pieces were discovered in Licence Area 351 in the South Coast dredging region, approximately 14 km south-west of Selsey Bill. Jon Jerromes discovered them at Burnley Southampton Wharf from the cargo of *City of Chichester*.

Tarmac_0810 is a collection of four dark, decaying waterlogged pieces of wood. The extent of erosion prevents the identification of the species of wood and makes it difficult to distinguish if the wood has been worked. The pieces vary in size; the largest being approximately 250 mm in length and 100 mm in width.

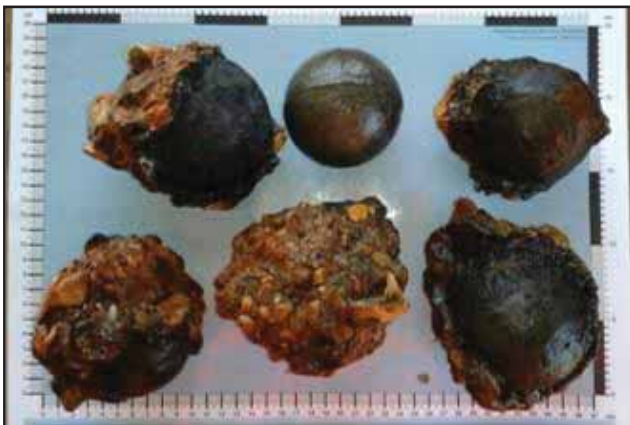
Based on the images, the wood appears to be unworked, suggesting that it represents the natural environment rather than a structure such as a ship wreck, fish trap or terrestrial structure. Furthermore, none of the pieces of wood exhibit any fastenings, which supports the suggestion that the wood is natural, however, one of the photographed pieces of timber (pictured) displays a relatively square hole which could have been associated with a fastening at one stage. One possibility is that the find could be a water worn piece of a larger timber object that could possibly be associated with a vessel or marine structure such as a jetty.

While it cannot presently be identified as such, the possibility that this piece of wood derives from a vessel should not be ruled out. Shipwrecks represent an important part of our marine historic landscape and are important in understanding some of the most fundamental aspects relating to human past and experience. Therefore, any further finds of archaeological interest discovered in this area should be reported through the protocol.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset





Tarmac_0811: 6 Cannonballs

These cannonballs were discovered in Licence Area 127 in the South Coast dredging region, approximately 13 km south, south east of Hengistbury Head. Jon Jerromes discovered them at Burnley Southampton Wharf.

Tarmac_0811 is a collection of six cast iron cannonballs, with an approximate diameter of 3 inches with various level of concretion. One of the cannonballs that is not in a shell of concretion displays a raised line around its circumference. This occurs when an iron cannonball is “cast”. A mould is made from two halves and the iron heated to a pourable liquid. The metal is poured in to the mould, cooled down and the mould opened (Groover 2010). Occasionally, a raised line will appear where both moulds met.

Based on the material and the size of the cannonballs that are not encased in concretion, it is believed that it may have been fired from a minion; a small brass cannon with small bore that would typically fire a 4 lb shot (Garrett 2010). This small cannon was used from the Tudor period up until the 17th century, therefore dating the cannonball itself is difficult. The minion features heavily in the Elizabethan Navy and is associated famously with the vessel *Context*, that managed to keep three ships and two galleons at bay using only one minion, one saker and one falcon in 1591 (Childs 2009). This type of cannon was also used in the English Civil War (1642-1651) where it is recorded as having a weight of 1200 lbs (Bull 2008). Eight minions also made up the armament of the famous ship, *Mayflower*, that carried pilgrims from Plymouth to the New World in 1620 (Bradford 1952).

A collection of cannonballs can be indicative of the location of a battle or a previously unrecorded shipwreck. Cannonballs have been previously found in License Area 127 which may be indicative of an area associated with naval warfare. Further discoveries should continue to be reported through the Protocol, as they could shed light on periods of naval conflict or a possible unknown wreck site.

References

- Bradford, W., 1952. *Of Plymouth Plantation, 1620-1647*. Rutgers University Press, New Jersey.
- Bull, S., 2008. *The Furie of the Ordnance: Artillery in the English Civil Wars*. Boydell & Brewer Ltd, Martlesham
- Childs, D., 2009. *Tudor Sea Power: The Foundation of Greatness*. Seaforth Publishing, Barnsley.
- Garrett, R. J., 2010. *The Defences of Macau: Forts, Ships and Weapons over 450 years*. Hong Kong University Press, Hong Kong.
- Groover, M. P., 2010. *Fundamentals of Modern Manufacturing: Materials, Processes, and Systems*. John Wiley & Sons, New Jersey.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for Dorset



Tarmac_0812: Brass plaque

This brass plaque was discovered in Licence Area 351 in the South Coast dredging region, approximately 14 km south-west of Selsey Bill. Dougal Boydy discovered it at Shoreham Wharf from the cargo of *City of Chichester*.

Tarmac_0812 is a brass plaque displaying the initials CM. The find is approximately 190 mm long by 80 mm wide and has two holes either side in order for the object to be mounted or affixed to a surface, that would have possibly been made of wood or metal.

Images of the plaque were sent to our in-house specialist, Bob Davis. He suggested that the CM initials could be anything from a manufacturers mark to a personal monogram. He also suggested that the script of the letters look more 20th century type face. It could be a makers plate for something such as a boiler or engine however, it would be expect that more information would be displayed on it or it could have been associated with a separate information plate. Anthony Mansfield, a marine engineer suggested it was a door plaque of some sort but possibly depicting a room for the Chief Mate. However, he said it was unclear whether this had come from a vessel and suggested it may be from a terrestrial context. Through online image searches, brass plaques have been found to depict the words CREW'S MESS from HMS Royal Scotsman, therefore it is possible that Tarmac_0812 is an abbreviation of this.

This object may have entered the marine environment via a number of routes. The item is not broken and therefore could be indicative of an unknown wreck site or from material lost or thrown overboard during every day shipping operations. Alternatively, it could have been discarded from a dock. License area 351 has produced a mixture of items that could possibly indicate the dumping of material. Though considered an isolated find, further finds of this type should continue to be reported, as they may be indicative of an unrecorded wreck site or related debris field.

Information about this discovery has been forwarded to:

- Historic England
- BMAPA
- The Crown Estate
- The Receiver of Wreck
- The National Record of the Historic Environment
- The Historic Environment Record for West Sussex

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