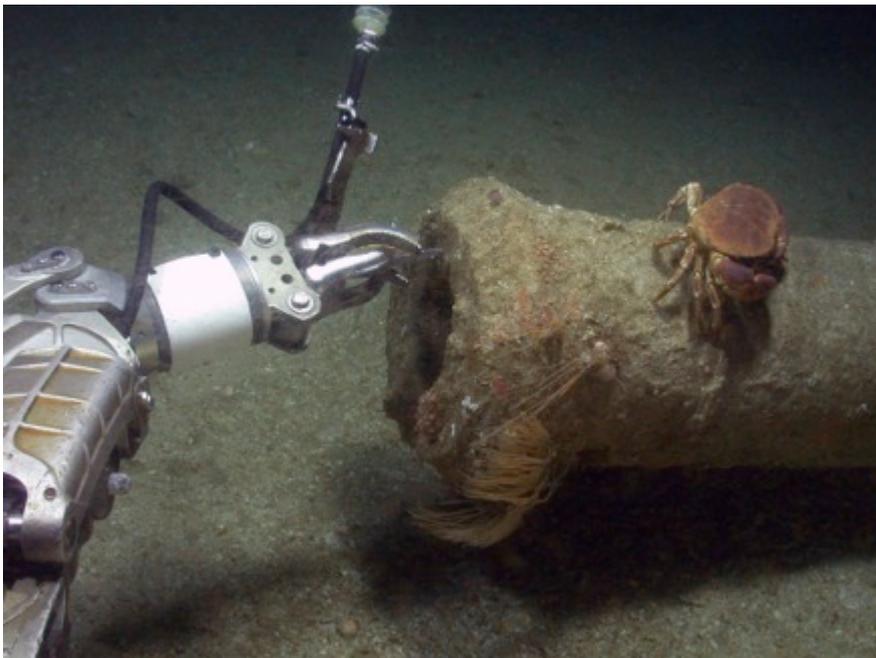




PROJECT DESIGN

A MITIGATION STRATEGY FOR THE WRECK OF THE FIRST RATE WARSHIP VICTORY (1744)



**Prepared by the Maritime Heritage Foundation
for the UK Ministry of Defence**

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NON-TECHNICAL SUMMARY

The *Victory* was a First Rate English warship of 100 guns launched in 1737 and wrecked in the Western English Channel on 5 October 1744. The site was discovered by Odyssey Marine Exploration in April 2008. It is the only wreck of a First Rate English warship discovered underwater worldwide.

Following a public consultation concerning the *Victory* conducted in March 2010 by the Ministry of Defence and the Department of Culture, Media and Sport, a contract dated 12 January 2012, and signed by the Secretary of State for Defence transferred to the Maritime Heritage Foundation:

- a) “every part of the said vessel; and
- b) all that is connected with her which is situated in the immediate vicinity of where she is lying (save insofar of personal property not belonging to the Crown).”

Four years of site monitoring between 2008-12 identified high risks to the surface archaeology, including cannon looting, dragging and bronze surface abrasion by bottom fishing and natural erosion. This Project Design proposes a mitigation strategy for the site based on preservation of record, recovery of the surface artefacts at risk, phased and targeted excavation and consideration of strategies for the *in situ* preservation of exposed hull remains.

The English Channel comprising the historical Narrow Seas is a particularly significant sealane that is pivotal to understanding the maritime history, archaeology and sense of identity of the British Isles. The Maritime Heritage Foundation considers it to be a key legacy to present and future generations that this heritage is protected and enhanced by measures appropriate to the *Victory* site’s harsh environment and importance.

Access to and the study of shipwrecks in deep seas outside territorial waters is a relatively new discipline, which is not subject to the same legal or regulatory regimes that apply to wrecks in territorial waters. No academic or heritage organisation in the UK has initiated a deep-sea project in or adjoining the UK outside territorial waters. Such studies bring new management challenges that are not necessarily compatible with methods and techniques appropriate to shallow waters.

Left unexamined the *Victory* will be subjected to ever-increasing erosion and loss of irreplaceable data and values. *In situ* preservation, other than for potential sub-surface structural remains, is not considered a sustainable means of sharing the site’s values or safeguarding its long-term conservation.

The wreck of the *Victory* is inaccessible to the public, at risk from irretrievable loss and a societally marginalised resource. The Maritime Heritage Foundation is committed to an exemplar research and rescue-oriented mitigation initiative based on the management principle of securing maximum primary data and expanding knowledge through the dissemination of scientific and education values.

A comprehensive non-disturbance survey was completed in 2012 and its results disseminated in scientific publications. This cutting-edge fieldwork exemplifies the standards anticipated to be achieved by the project.

The Maritime Heritage Foundation intends to make the collection’s artefacts available in exhibition form, detailed scientific publications and through the virtual dive trail launched in 2013 (www.victory1744.org).

The structure of this Project Design is based jointly on Rules 9-10 of the Annex of the UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001) and the *Standard and Guidance for Archaeological Excavation* (IfA, 2008: 3.2.17).

The project complies with the archaeological principles of the Annex of the UNESCO Convention. The artefact assemblage from the wreck will be retained as a unified archive pursuant to the collection policy of the Maritime Heritage Foundation, taking into account its obligations under the wreck's Deed of Transfer.

The *Victory* project is in line with Government strategy on heritage as defined in *UK Marine Policy Statement* (HM Government, March 2011: 2.6.6.2, 2.6.6.3):

“The historic environment of coastal and offshore zones represents a unique aspect of our cultural heritage. In addition to its cultural value, it is an asset of social, economic and environmental value. It can be a powerful driver for economic growth, attracting investment and tourism and sustaining enjoyable and successful places in which to live and work. However, heritage assets are a finite and often irreplaceable resource and can be vulnerable to a wide range of human activities and natural processes... Opportunities should be taken to contribute to our knowledge and understanding of our past by capturing evidence from the historic environment and making this publicly available, particularly if a heritage asset is to be lost.”

KEY MANAGEMENT PRINCIPLES

This Project Design summarises the holistic vision of the Maritime Heritage Foundation for the *Victory* Shipwreck Project, presenting the overall concept for the project, including fieldwork, curation, archiving, funding, public outreach and publication.

Implementation

A set of Key Management Principles has been formulated in consultation with the UK Ministry of Defence Advisory Group, whereby the Maritime Heritage Foundation (MHF) agrees:

1. MHF is responsible for the timely implementation of the Project Designs and for the management of the wreck site and any material recovered therefrom pursuant to the conditions of the Terms and Conditions of the Transfer of Title from the MoD dated 12 January 2012.
2. MHF assumes the responsibility for obtaining any relevant consents and for the conduct of its contractors and sub-contractors for their adherence to conditions contained in relevant consents obtained pursuant to a Project Design.
3. The proposals formulated within this Project Design align with relevant professional and sector standards and guidance.

Reporting Programme

4. MHF will provide the Advisory Group with regular reports, at a frequency to be determined, for any works that are agreed should be undertaken on the wreck site.
5. Such reports will include as a minimum:

- Details of methods and techniques used, with relevant guidance/standards;
- Results achieved;

- Artefacts and non-artefactual evidence and remains recovered with proposals for their conservation;
- Basic graphic and photographic documentation;
- Recommendations for future activities;
- Recommendations/plans for the future management and public display of any artefactual and non-artefactual evidence recovered;
- Plans for the publication and dissemination of any work undertaken;
- Specific recommendations and plans for the appropriate reburial of any human remains accidentally recovered.

Human Remains

6. The *Victory* Shipwreck Project will adhere to the *Guidance for Best Practice for Treatment of Human Remains Excavated from Christian Burial Grounds in England* (English Heritage & the Church of England, 2005). Respectful deposition will be arranged through consultation with the Joint Casualty and Compassionate Centre (JCCC) of the MoD.¹

7. Activities at the wreck site will avoid the unnecessary disturbance of human remains. Wherever possible, human remains will be left *in situ*.

8. The MHF agrees that any human remains will be treated at all times with the utmost respect and sensitivity and to use its best endeavours not to disturb them and to minimise any disturbance that proves to be inevitable, and will ensure that its contracts and agents abide by this. Any human remains that are unavoidably disturbed will be documented *in situ* following the same contextual recording procedures applied to all other cultural remains on the wreck site.

9. Should human remains be accidentally retrieved, the Ministry of Defence (Navy Command) will be immediately notified. Further treatment of such remains will be as directed by Navy Command.

10. No photographic or other images of human remains will be published, and no publicity material will refer to any human remains associated with the wreck without prior written authorisation from Navy Command.

11. Human remains will not be considered as artefacts under the terms of the Project Design or this framework.

Landing of Artefacts

12. Except where maritime emergency or stress of weather necessitate otherwise, the MHF and its contractors and sub-contractors will land any recovered artefacts at a site within the United Kingdom or the Channel Islands. The MHF will be responsible for ensuring that a declaration of any such items is made to the Receiver of Wreck under the provisions of the Merchant Shipping Act 1995 or any succeeding legislation.

13. The MHF is responsible for the appropriate storage, treatment and conservation of their recovered artefacts and will ensure that the Advisory Group and/or its representatives have access to the storage facility upon demand.

¹ In line with *Human Remains from Wreck Sites: a Proposed Policy for Consultation* (English Heritage, 2013).

Treatment of Recoveries

14. Archaeological material recovered from the wreck site of *Victory* 1744 under the authorisation of the Maritime Heritage Foundation, and the associated archive including site plans, drawings and photographs, will form the ‘*Victory* 1744 Collection’ and will be subject to the following conditions:

15. In managing the Collection, the MHF will abide by the Museums Association’s *Code of Ethics for Museums* (2008).

16. All such recovered archaeological material and its associated archive should remain together as a single assemblage wherever possible.

17. The Collection will be managed in line with the archaeological principles of the UNESCO Convention on the Protection of the Underwater Cultural Heritage, including Rule 2 to the Annex.²

18. Where the disposal of any material from the Collection is proposed, the archaeological principles of the Annex to the UNESCO Convention and the Museums Association’s Code of Ethics will be applied.

19. Any decision to dispose of archaeological material from the Collection by the Maritime Heritage Foundation will not be made without full consideration of the merits of the case, taking into consideration appropriate advice from the Advisory Group and requiring the written consent of the Secretary of State for Defence.

20. In exceptional circumstances where consent is given to the disposal of the archaeological material from the Collection, it shall normally be limited to the transfer of such material to an accredited museum or a body registered as a charity in England and Wales or Scotland, rather than to private individuals or organisations.

Acknowledgements

This Project Design was written by Dr. Sean Kingsley in collaboration with Neil Cunningham Dobson and Frederick Van de Walle. Guidance was provided by Lord Lingfield, the Trustees of the Maritime Heritage Foundation, and Dr. Margaret Rule, CBE, Ivor Noël Hume, OBE, and Commander John Bingeman of the Foundation’s Scientific Advisory Committee. Dr. Douglas McElvogue of TrenDarc advised on

² Rule 2 of the UNESCO Convention states that “the commercial exploitation of underwater cultural heritage for trade or speculation or its irretrievable dispersal is fundamentally incompatible with the protection and proper management of underwater cultural heritage. Underwater cultural heritage shall not be traded, sold, bought or bartered as commercial goods. This Rule cannot be interpreted as preventing: a) the provision of professional archaeological services or necessary services incidental thereto whose nature and purpose are in full conformity with this Convention and are subject to the authorization of the competent authorities; b) the deposition of underwater cultural heritage, recovered in the course of a research project in conformity with this Convention, provided such deposition does not prejudice the scientific or cultural interest or integrity of the recovered material or result in its irretrievable dispersal; is in accordance with the provisions of Rules 33 and 34; and is subject to the authorization of the competent authorities.”

elements of the Project Design's structure and content. Cannon specialists Charles Trollope, FSA, and Nico Brinck advised on the formulation of the 'HMS *Victory* Cannon Recording Sheet' templates.

ABBREVIATIONS

Advisory Group	Advisory Group to the MoD (MoD, English Heritage & National Museum of the Royal Navy)
AIS	Automated Identification System
DCMS	Department for Culture, Media & Sport
FADE	Ferrous Anomaly Detection Equipment
IfA	Institute for Archaeologists
INS	Inertial Navigation System
MHF	Maritime Heritage Foundation
MoD	Ministry of Defence
MMO	Marine Management Organisation
OME/Odyssey	Odyssey Marine Exploration
ROV	Remotely-Operated Vehicle
SeRF	Sediment Removal & Filtration
TSS	Teledyne TSS Non-Ferrous Metal Detector
SPRINT	Sonardyne Subsea Precision Reference Inertial Navigation Technology
SBI	Sub-Bottom Imaging
Site 25C	The Wreck of <i>Victory</i> 1744
UNESCO Convention	The UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001)

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1. SUMMARY DESCRIPTION

1.1 The *Victory* is the wreck of a First Rate English warship lost in the Western English Channel during a storm on 5 October 1744 (site 25C). Odyssey Marine Exploration discovered its remains in April 2008.

1.2 The site has been subjected to five years of survey, monitoring and research, culminating in the completion of an extensive non-disturbance survey in March-August 2012 under the direction of Odyssey on behalf of the Maritime Heritage Foundation.

1.3 The Maritime Heritage Foundation has been requested by the Ministry of Defence Advisory Group to prepare a Project Design for the non-disturbance recording, surface artefact recovery, phased excavation, publication and post-excavation management of the wreck of *Victory* 1744.

1.4 This Project Design has been formulated with reference to the Annex of the UNESCO Convention on the Protection of the Underwater Cultural Heritage, the *Standard and Guidance for Archaeological Excavation* (IfA, 2008), the *Standard and Guidance for Nautical Archaeological Recording and Reconstruction* (IfA, 2008) and the *Code of Ethics for Museums. Ethical Principles for All Who Work for or Govern Museums in the UK* (Museums Association, 2008).

1.5 This design also expands upon the key management principles stipulated for the project by the Ministry of Defence's Advisory Group.

1.6 The document synthesises and develops three previous operational plans presented by the MHF to the MoD Advisory Group: *HMS Victory, 1744 (Site 25C) – Project Design* (February 2012); *HMS Victory, 1744 (Site 25C) – Project Design: Revision A* (June 2012); and *HMS Victory (1744). Key Management Principles* (April 2013).

2. LEGAL STATUS

2.1 The wreck of the *Victory* contains the archaeological remains of a First Rate English warship lost in 1744. Upon discovery the ship remained a sovereign vessel owned by the Admiralty until the ownership passed by contract in 2012 to the Maritime Heritage Foundation.

2.2 The wreck lies outside UK territorial waters and is not legally protected through the Protection of Wrecks Act 1973. English Heritage has no statutory control over shipwrecks located outside territorial waters.

2.3 The wreck has not been designated a war grave through the Protection of Military Remains Act 1986. Access is not prohibited as a controlled site.

2.4 The Law of the Sea Convention provides coastal States with no direct jurisdiction over Underwater Cultural Heritage on the continental shelf and in the Exclusive Economic Zone (Dromgoole, 2011: 25), where site 25C is located. This reality creates complex management and conservation challenges, including the inability of the UK Government and the MHF to protect the site from illicit intervention or salvage by foreign flag vessels.

2.5 Ownership of *Victory* 1744 was transferred from the MoD to the MHF in January 2012 by a Deed of Transfer, setting forth that “The Secretary of State [for Defence] hereby transfers to the Company: a) every part of the said vessel; and b) all that is connected with her which is situated in the immediate vicinity of where she is lying (save insofar of personal property not belonging to the Crown)”. The MHF is a charitable Trust whose objectives are “to locate, excavate, recover, raise, restore, and/or preserve ship wrecks for the education and benefit of the Nation.”

2.6 Under the Deed of Transfer the MHF requires the consent of the Secretary of State for Defence “to disturb, remove from the seabed, sell, charge, lease give or otherwise dispose of anything transferred”. Both the MHF and the Secretary of State are advised by an Advisory Group composed of a representative from the MoD, the National Museum of the Royal Navy, and English Heritage.

2.7 The disturbance of seabeds through intrusive activities, including shipwreck sites, in some cases requires a licence from the Marine Management Organisation in accordance with the Marine and Coastal Access Act 2009. The MMO informed the Maritime Heritage Foundation in August 2012 that a licence would be required for certain future intrusive activities, which had not been defined formerly by the MMO. If legally required, an MMO licence will be applied for following the acceptance of the current Project Design.

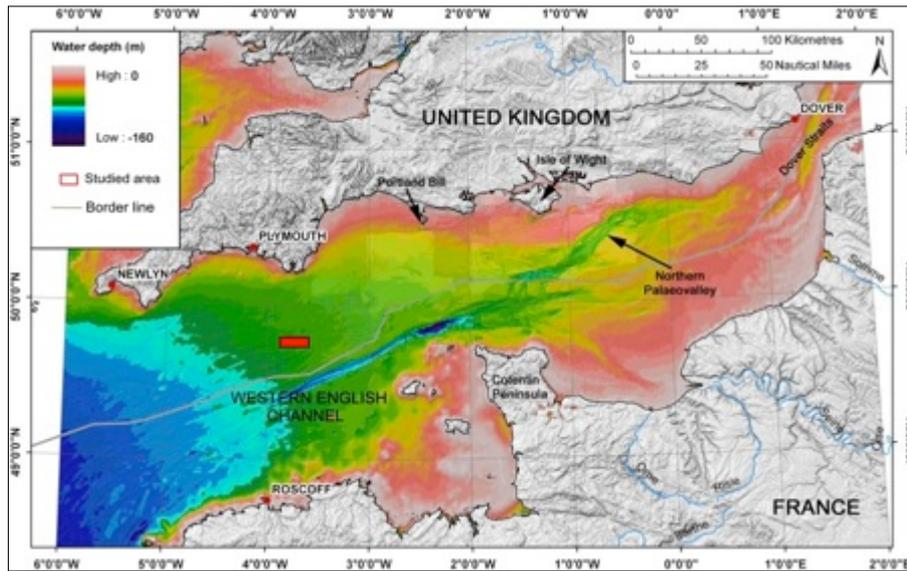


Fig. 1. General location of site 25C in the Western English Channel (red rectangle).

3. SITE LOCATION, ENVIRONMENT & DESCRIPTION

3.1 Site 25C was discovered by Odyssey in April 2008 at a depth of 74m, approximately 80km south-east of Plymouth in the Western English Channel (Fig. 1). Continuous remains cover an area of 60 x 42m. The discontinuous site boundaries extend across a total area 84m north/south (anchor A2 to the rudder) and 305m east/west (cannon C32 to C47). Geophysical analyses identifying ferrous (FADE) and non-ferrous (TSS) metallic anomalies signify the likely presence of two nucleated debris fields within these wider parameters. Debris Field 1 (83 x 83m) is located northeast of the wreck mound perimeter. Debris Field 2 (40 x 40m) is located 57m southeast of the wreck mound perimeter and 30m east of Sandwave 1 (Fig. 2).

3.2 The stern lies to the southwest, identified by the rudder, whose main piece is preserved for a length of 9.40m. The wood's condition is poor, but important structural features identified include the head, main piece, pintles, lead score lining and sacrificial protection. The bows lie to the northeast, defined by the surface presence of anchors A1 (Area B1) and A2 (offsite 23m north of the wreck mound) (Fig. 3).

3.3 The wreck is a discretely bounded ellipsoidal mound with a 50cm elevation above the surrounding sea floor. It is flanked around 22m to the east by Sandwave 1. The wreck and sandwave are elevated highs on a generally even and featureless seabed. To the west the seabed descends smoothly down to bedrock at a depth of 74.1m. To the east the seabed descends smoothly in a gentle depression towards Sandwave 1, which reaches a localised high of 68.1m (Fig. 2).

3.4 Side-scan and multibeam sonar indicate that the orientations of the sandwave and low-lying parallel sand ripples on site 25C reflect a dominant northeast/southwest tidal current that changes 180° every six hours. The morphology of Sandwave 1 has remained stable during the research period (2008-2012).

3.5 Small sand ripples constantly move across the site. Sediment levels fluctuate randomly by at least 30cm. The sedimentology comprises extensively sorted and

dynamic coarse to very coarse sand (68.1-83.3%) and gravel (14.3-31.1%) indicative of the winnowing of finer sediments through strong daily current movement of up to 2.0 knots (Prave *et al.*, 2013). The wreck mound is subjected to a constant and unpredictable process of localised scouring, erosion and re-burial determined partly by the obtrusive nature of surface artefacts. The current regime combined with fishing trawler impacts is believed to account for the absence of artefacts (glass, ceramics etc) on the site’s surface.

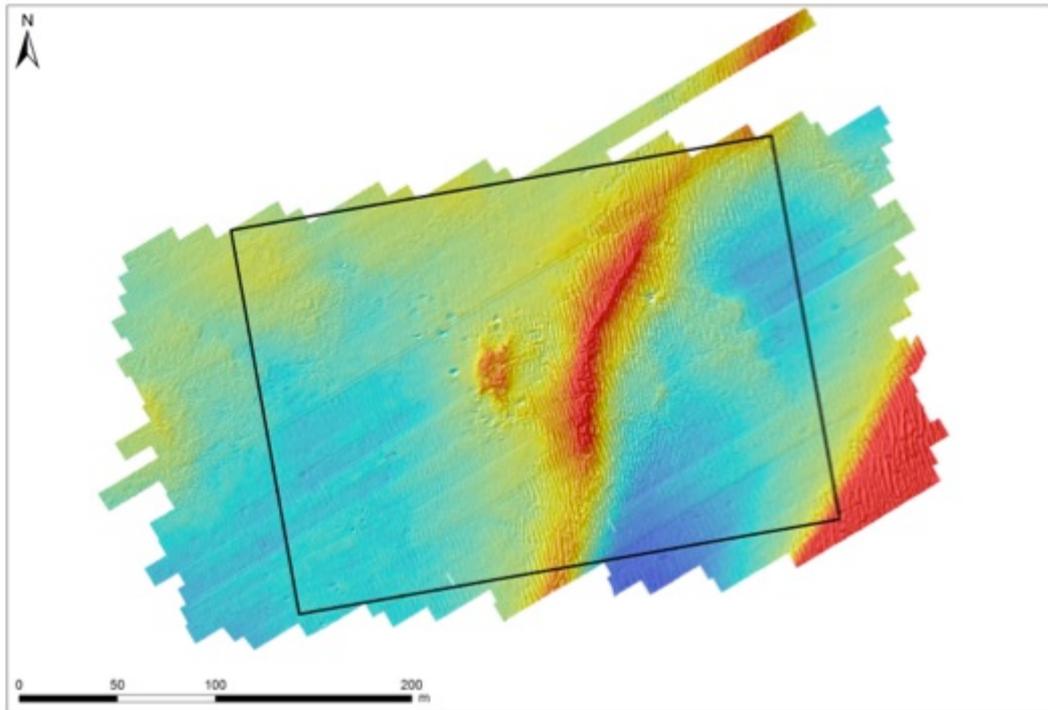


Fig. 2. Multibeam image of site 25C within its macro-environmental setting, and Sandwave 1 to its east.

3.6 Pockets of the natural gravel and pebble substrate are visible on parts of site 25C’s surface. The stratigraphy seems to deepen from west to east corresponding to the natural bathymetry, reaching possible depths of 2.5-3.0m at the eastern site periphery.

3.7 The surface remains have been divided into seven archaeological areas (Fig. 3). The wreck’s surface is characterised by 50 bronze guns, which are technically not *in situ*, but have been impacted by a combination of natural forces, bottom fishing and looting (Kingsley *et al.*, 2012). Surface remains are overall incoherent, insubstantial and poorly preserved, and include a small volume of disarticulated hull remains and rigging, two anchors, at least two grinding stones/gunner’s wheels, scattered parts of a copper kettle and one intact glass bottle. *In situ* remains comprise the cooking galley hearth (Area C1), iron ballast blocks extending longitudinally down the keel line (Area F), and the rudder to the south (Area H).

3.8 Sub-bottom imaging points to the potential survival of a significant number of additional cannon and cultural remains beneath sediments down to depths of at least 80cm, with 79% confined to a 0-0.2m burial depth. The existence of Sandwave 1 seemingly overlying a geological trough is likely to correspond to optimum site preservation on the eastern wreck with stratigraphy potentially present in pockets down to 3m.

3.9 The absence of surface archaeology west of Area F suggests that the *Victory* listed to starboard when she struck the seabed and deteriorated, forcing the portside decks and guns to collapse eastwards. This theory is supported by the 2012 non-disturbance survey that identified through Sub-Bottom Imaging limited anomalies west of Area F’s ballast and a major concentration of anomalies seemingly buried on the east edge of the wreck mound in shallow deposits (potentially up to 37 guns).

3.10 The 2012 marine biological survey of site 25C recorded 38 species of invertebrates and 21 species of vertebrates with a total value of 17,323 (40 vertebrates and 13,269 invertebrates). These are all common species forming an anticipated shipwreck oasis effect. The high volume of hermit crabs (>10,147) has been identified as caused by the dumping of by-catch over the wreck by a French trawler immediately prior to the marine biological survey. Marine organisms covering the surface artefacts and structural remains are light, indicative of the dynamic nature of the currents and sediment movement.

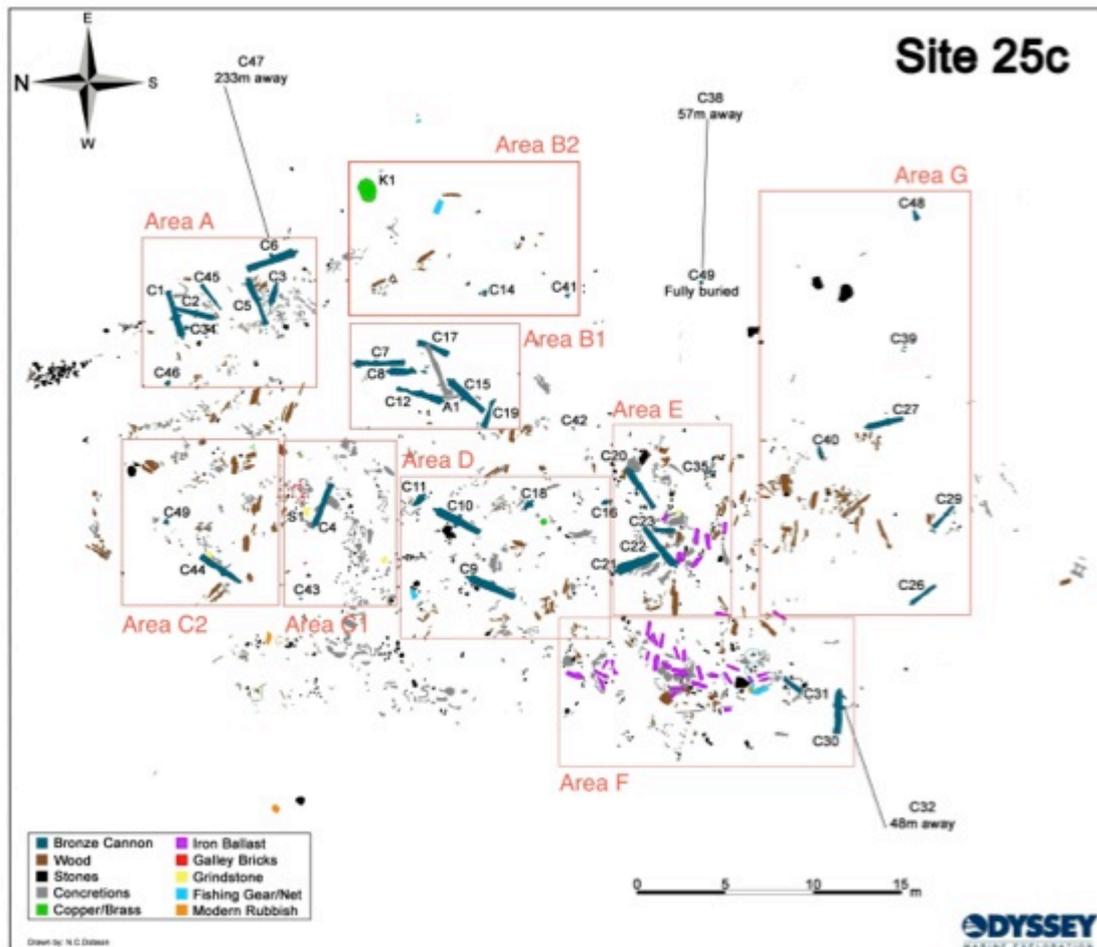


Fig. 3. Site plan of 25C with designated archaeological Areas.



Fig. 4. A full hull model of the *Victory* dated to 1737, probably assembled at the Royal Naval Academy, Portsmouth Dockyard. Photo: © National Maritime Museum Greenwich, SLR0449.

4. HISTORICAL & ARCHAEOLOGICAL BACKGROUND

4.1 Historical Background

4.1.1 Documentary research on the biography of the *Victory* has been published (Cunningham Dobson and Kingsley, 2010). A short synthesis of the main attributes of the site is provided below as a statement of the site's historical and archaeological level of interest.

4.1.2 **Build.** The *Victory* is of high importance as the sole three-decker First Rate ship-of-the-line built to the 1733 Proposed Establishment (Fig. 4). She was nominally a re-build of the *Victory* disassembled in 1721, although probably an entirely new structure that did not include recycled timbers but followed its predecessor's scantlings. *Victory* was designed to function as a flagship and naval deterrent. Contemporary sources described her as the greatest warship in the world. As one of seven First Rates technically maintained at any one time on the Navy List between 1682 and 1756, and as the sole example found in the modern era subject to archaeological investigation, the wreck is a unique representative of the Royal Navy's most spectacular fighting machine. *Victory* was also the final British warship armed exclusively with 100 bronze cannon, cast by Andrew Schalch at the Royal Brass Foundry, Woolwich. The likely survival of the entire gun assemblage is of high importance with unparalleled potential for the study of 18th-century gunfounding. The ship was infamously high-sided and crank due to defects in her proportions. Her construction coincided with major logistical problems sourcing wood in the New Forest, poor timber seasoning in dockyards, and problems of inadequate warship ventilation causing planking to rot. This may partly explain the need for refits in March 1737 and January 1740, including the insertion of new large wooden knees

(ADM 106/895/30; 106/920/38; 106/920/80). Aspects of these issues may be identified through species analysis sampling of surviving hull remains.

4.1.3 Use. *Victory* never participated in a major battle and was absent from the great engagement of her age, the Battle of Toulon of 11 February 1744. As flagship of the Western Squadron, she was primarily involved in the local defence of the realm from French and Spanish incursions, and the protection of naval and commercial convoys. In her final assignment *Victory* escorted 200 merchant vessels beyond the English Channel in July 1744 before gathering intelligence on French warship movements, liberating on 30 August a Mediterranean-bound naval supplies convoy blockaded at Lisbon, and continuing to Gibraltar. A source states that while off the River Tagus the *Victory* took onboard “400,000 pounds sterling that it had brought from Lisbon for our merchants” (*Amsterdamsche Courant*, 18/19 November 1744). The ship sank in a ferocious storm, allegedly off the Channel Isles, on 5 October 1744. The *Victory* is of high importance as an exceptional example of the largest class of high-status British naval vessel. The ship’s 100 bronze cannon and related fittings offer unparalleled insights into early Georgian naval warfare prior to the subsequent transition to iron guns. If preserved the domestic assemblages hold the potential to define shipborne life for the period. No comparable remains exist: the only other British First Rate known underwater, the *Royal George* (lost Spithead, 1782), was extensively salvaged, including using explosives, from the late 18th century to 1840. The *Victory* is of national and international interest as the type-site vessel of the Royal Navy used in domestic and international contexts.

4.1.4 Loss. The *Victory* is of high importance with regard to her loss due to her First Rate status and enigmatic disappearance, which confounded the Admiralty and naval scholars for centuries. The ship’s rediscovery overturns the Casquets loss myth and solves one of England’s great maritime mysteries. When lost, the *Victory* was under the command of Admiral Sir John Balchin,³ the longest serving naval commander of the age (dedicating 58 years of service to the Royal Navy) and had 1,100 men onboard, including 50 volunteers from England’s noblest families. *Victory* was associated with highly significant people. The loss of life and association with a legendary commander are of high historical and potentially evidential importance by predating the better studied Age of Nelson. The implications of her loss indicate importance within a national and international dimension of interest.

4.2 Site Survey & Monitoring, 2008-2012

4.2.1 The *Victory* wreck site was discovered by Odyssey in April 2008 during an extensive archaeological survey of the Western English Channel using side-scan sonar and magnetometry. A comprehensive non-disturbance survey was conducted between May and October 2008, supplemented by small-scale targeted trial trenching of anchor A2 and the rudder, plus dusting of mobile sediments around two cannon prior to their recovery.

4.2.2 The 12-pounder cannon C28 and 42-pounder C33 were recovered in October 2008 for study, conservation and public display (Trollope, 2011; Van de Walle, 2011). These comprise the only artefacts recovered from site 25C to date.

4.2.3 In October 2009, a study was published into fishing pressures in the Western English Channel, including the *Victory* site (Kingsley, 2010). Based on bottom gear furrows present on side-scan sonar imagery, cannon conditions, the unstructured

³ The spelling of ‘Balchin’ within the historical sources is often interchanged with ‘Balchen’.

character of surface cannon, fishing gear snagged on the sea bottom and extensive aerial and satellite Vessel Monitoring Systems (VMS) analysis, scientific data was presented to argue that the *Victory* had been significantly impacted by bottom fishing (Table 2).

Date	Activity	Surveyor
April 2008	Side-scan sonar & magnetometer survey	Odyssey Marine Exploration
May 2008	Survey of surface archaeological features; non-disturbance photomosaic	Odyssey Marine Exploration
February 2009	Side-scan sonar	Odyssey Marine Exploration
June 2009	Side-scan sonar, multibeam survey	Wessex Archaeology
April 2011	Non-disturbance cannon survey	Odyssey Marine Exploration
May 2011	Side-scan sonar survey	Odyssey Marine Exploration
October 2011	Non-disturbance photomosaic	Odyssey Marine Exploration
February-August 2012	Side-scan sonar, magnetometer, multibeam survey; non-disturbance photomosaic x 2; survey of surface archaeological features; geophysical analyses (FADE, TSS, SBI)	Odyssey Marine Exploration

Table 1. Summary of monitoring forms conducted on the *Victory* site, 2008-2012.

Date	Activity	Impacts
April 2008	Side-scan sonar & magnetometer survey	Fishing gear furrows 500-1,000m from the wreck
May 2008	Video & photographic survey of surface archaeological features. Non-disturbance photomosaic	Severed cannon muzzles (C26 & C27), fishing net & lobster pot on site, 4-ton guns C32 & C38 dragged 48-57m offsite, deeply scratched scars on multiple cannon, including recovered C28 & C33
February 2009	Side-scan sonar, multibeam survey	Fishing gear furrows 100m from the wreck
April 2011	Non-disturbance video & photographic survey	Five displaced cannon (C2, C4, C20, C21, C22)
October 2011	Non-disturbance photomosaic, video & photographic survey	Cannon C13 looted, three guns displaced on-site (C26, C27, C30), broken protective concretions on 16 cannon
February 2012	Side-scan sonar, non-disturbance photomosaic, video & photographic survey, AIS monitoring	One cannon dragged 233m offsite (C47), new fishing net, by-catch dumped on-site, French & English trawlers & potters working on & adjacent to <i>Victory</i>
May 2012	Video & photographic survey	Cannon C38 (57m offsite in February 2012) no longer present (dragged by fishing trawlers)

Table 2. Physical impacts recorded on the *Victory* site, 2008-2012.

4.2.4 In September 2009 and December 2009, Wessex Archaeology published an archaeological desk-based assessment of the *Victory* site and the results of a geophysical survey commissioned by English Heritage on behalf of the Department of Culture, Media and Sport. Wessex Archaeology identified site 25C as of 'Medium-

High’ overall importance and of a ‘National/International’ overall sphere of interest (Wessex Archaeology, 2009A; Wessex Archaeology, 2009B).

4.2.5 Between 2009 and 2012, Odyssey monitored the *Victory* site using remote-sensing tools (Table 1), of which repeat high-resolution photomosaics proved to be a particularly powerful tool.

4.2.6 The photomosaic record documented in 2008, 2011 and 2012 revealed a pattern of ongoing natural and man-made impacts that are eroding the shipwreck’s structural integrity. 100% of the seven designated Areas were impacted by external human forces (trawlers and illicit looting) between 2008 and 2012 (Kingsley *et al.*, 2012).

4.2.7 A 24-pounder bronze cannon, 3.03m-long, was illegally looted in July 2011 by a Dutch salvage ship using a hydraulic grab (cannon C13) (Kingsley *et al.*, 2012: 5-6) (Fig. 21).

4.3 Non-Disturbance Survey 2012

4.3.1 Between February and August 2012, Odyssey conducted on behalf of the MHF a comprehensive non-disturbance survey that completed Project Design Phases 1-2 (Tables 3-4). The wide ranging initiatives applied included side-scan and multibeam sonar, the production of two photomosaics (Figs. 6-7), the recording of all surface features, remote geophysical sensing for ferrous (FADE), non-ferrous (TSS) and other sub-bottom anomalies (SBI) (Fig. 5), and an environmental and marine biological site assessment in collaboration with the University of St. Andrews, Scotland, and the University of Huelva, Spain. Three sacrificial frames containing metal and wood samples were buried offsite as part of an environmental study programme. Scientific reports on the Phase 1-2 non-disturbance activities have been published (Morales González and Lozano Guerra-Librero, 2013; Prave *et al.*, 2013; Seiffert *et al.*, 2013).

4.3.2 Surface cannon that are considered most at risk, including guns that have been obviously recently damaged or dragged, were recorded by Odyssey between February and August 2012 and prepared for lifting pending future permission.

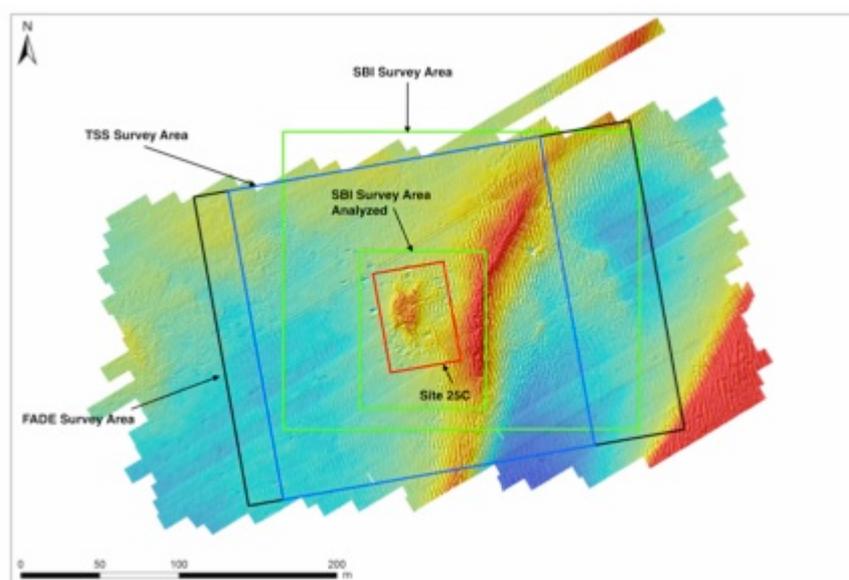


Fig. 5. Areas of geophysical analysis completed during the 2012 non-disturbance survey.

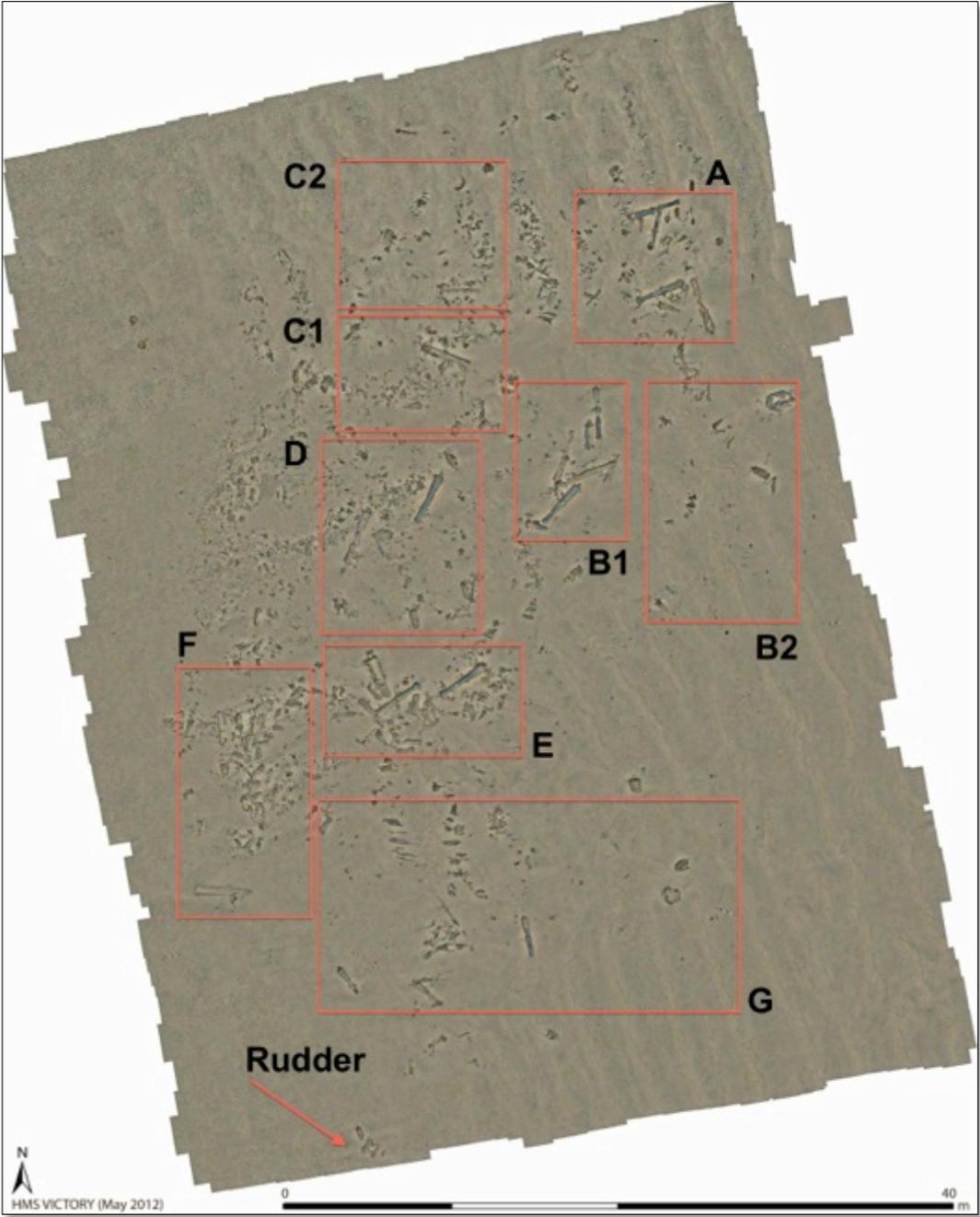


Fig. 6. Site 25C May 2012 non-disturbance photomosaic with archaeological Areas denoted.

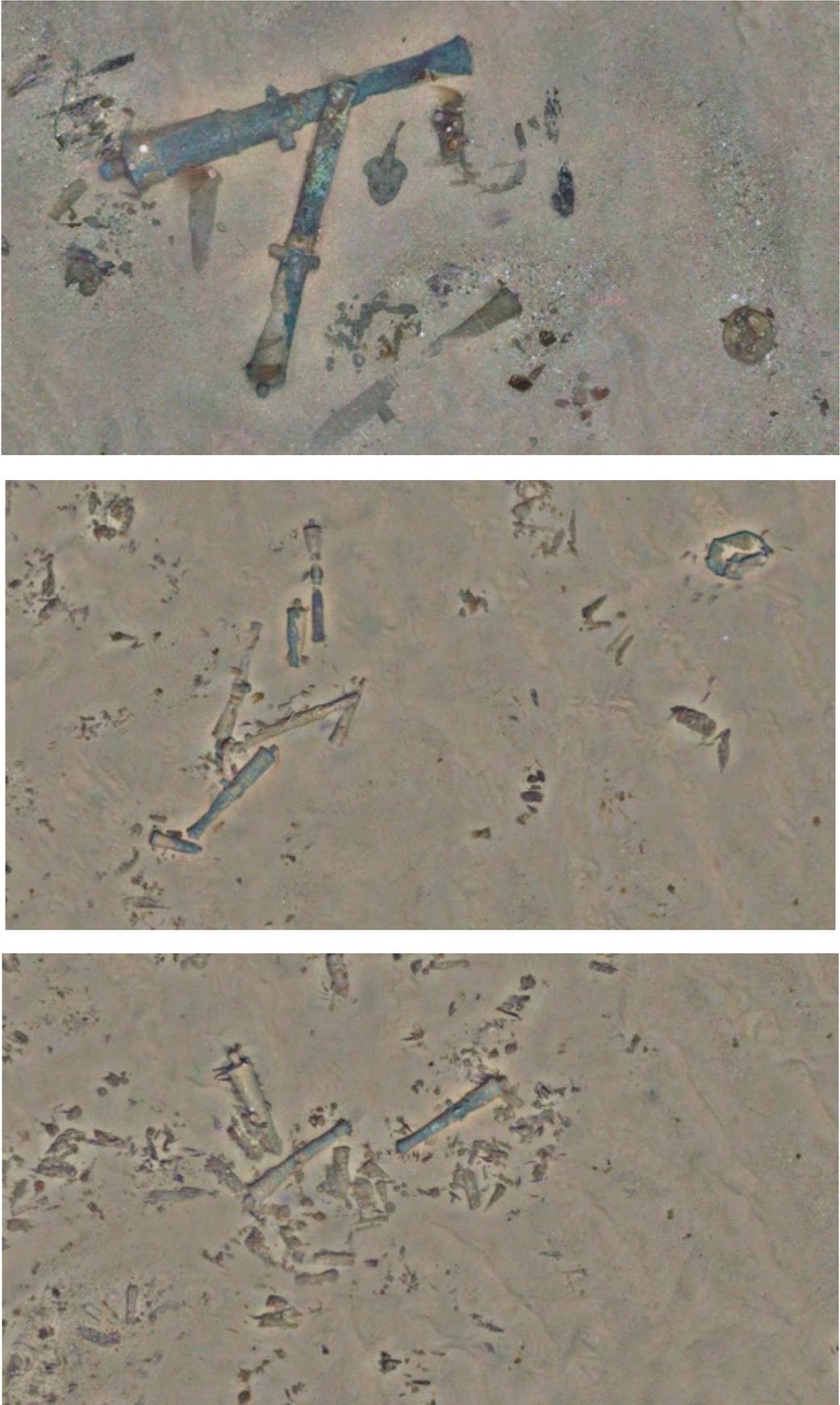


Fig. 7. May 2012 non-disturbance photomosaic: crops of Areas A, B1 and E (top to bottom).

Phase	Action	Area Examined 2012	Compliance
1A	Test fly ROV systems	Off-site	Yes
1A	Establish array transponder beacons & datum markers		Yes
1A	Imposition virtual site grid	Central site	Yes
1A	Side-scan survey, 2 x 2km	5.5km square	Exceeded
1A	Multibeam survey, 400 x 200m	5.5km square, plus use of wider Wessex Archaeology multibeam data	Yes
1A	Visual survey, 200 x 200m	200 x 200m zone	Yes
1A	FADE survey, 200 x 200m	280 x 200m	Exceeded
1A	TSS survey, 200 x 200m	200 x 200m	Yes
1A	Sub-bottom imaging survey *	225 x 190m	Exceeded
1A	Burial offsite of modern sacrificial materials	Burial 70m northeast of wreck	Yes

* Not stipulated in the Project Design, but conducted on 20 October 2011 & processed for Phase 1A site interpretation.

Phase	Action	Area Examined 2012	Compliance
1B	High-resolution photomosaic, 65 x 40m	64 x 45m	Yes
1B	Photographic record surface artefacts & archaeological features	200 x 200m	Yes
1B	Measurements salient surface artefacts	Site-wide	Yes
2	Environmental analysis: current directions & speed, temperature, salinity, water ph.	Monitoring device fitted to ROV for live data stream logging	Yes
2	Sampling sediment stratigraphy	Surface sediments recovered	Yes
2	Marine Biological site assessment	Video & photographic survey completed	Yes
2	Intrusive pollutant assessment & recording	200 x 200m	Yes

Tables 3-4. Summary of Phases 1-2 non-disturbance survey deliverables on site 25C, 2012.

4.4 In Situ Preservation Capacity

4.4.1 In terms of risk assessment (cf. *Protected Wreck Sites at Risk. A Risk Management Handbook*, English Heritage 2008: 2), the current condition of the wreck of the *Victory* is generally unsatisfactory with extensive problems. The site is highly vulnerable to natural and anthropogenic influences. Site monitoring indicates a management trajectory of inappropriate decline.

4.4.2 The *Victory* site has been subjected to four years of non-disturbance monitoring (Kingsley *et al.*, 2012). Techniques employed ranged from the application of geophysical techniques (side-scan sonar, magnetometer and multibeam surveys) to the recording of surface features and their changes over time (multiple photomosaics, video and still digital photography), and sub-bottom profiling and imaging (FADE: ferrous anomalies; TSS: non-ferrous anomalies; SBI: sub-bottom imaging multiple anomalies). The study was complemented by an environmental and marine biological assessment conducted in 2012.

4.4.3 Insufficient hull remains are present on the surface of site 25C to warrant an *in situ* preservation programme currently. Any intrusive activities that expose coherent

hull remains below the seabed surface considered to be at risk from erosion, loss or marine borers will be appraised for *in situ* preservation options.

4.4.4 The UK Government has recognised that a threat to the *Victory* site exists through the illegal recovery of surface artefacts. The immediate threat is to the surface cannon and artefacts through ongoing natural exposure and the erosion of near-surface remains (upper 30cm stratum).

4.4.5 The suitability of covering and barrier methods for *in situ* preservation (cf. Palma, 2005; Manders, 2011: 25-37) has been duly considered as a first option of management of site 25C in line with Article 2.5 of the UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001).

4.4.6 Consideration of chemically and environmentally inert interlocking ‘crash barriers’ to create a cofferdam filled with sand (to withstand wave loading, scouring and maintain sufficient sediment coverage), as trialled on the *James Matthews* site (1841), Australia (Godfrey *et al.*, 2004: 349-50; Richards *et al.*, 2009: 117-8), has been concluded to be impractical within this environment for four reasons:

- A. Without publicising the wreck’s location widely within an international framework, the MHF is not convinced that such barriers will be avoidable by fishing boats. As a low relief (50cm) protrusion on the seabed, site 25C is easily mistakable as a natural geological formation, which potentially may be impacted by trawlers’ bottom gear.
- B. The presence of a magnified seabed obstacle is likely to have a detrimental effect within some quarters by drawing unwanted attention and interference to the site.
- C. The establishment and maintenance of any physical barriers on the seabed within a deep-sea environment off the UK is impractical and untested.
- D. The effects of totally sealed cofferdams on the microenvironment of wreck sites has not been extensively evaluated and there is potential for detrimental on-site changes to occur (Godfrey *et al.*, 2004: 350).

4.4.7 The use of polypropylene debris netting to cover and protect the surface archaeology and underlying strata has been considered. Such methods have been widely tested, especially for archaeological use in the Netherlands and during the EU MoSS Project (Manders and Lüth, 2004: 65; Manders, 2011: 32). On the *Victory* site the theoretical objective would be to attract fine sediment under the net to create an underwater burial mound sealing the archaeological remains *in situ* within an anaerobic environment. This method is considered inappropriate for site 25C because:

- A. Netting trials on the shallow-water HMS *Colossus* and the Swash Channel wrecks proved unsuccessful. While the net accumulated limited sediments, it became weighed down by algae and coarser sediment trapped in the mesh, resulting in its collapse onto the seabed and thus ineffectiveness (Parham and Palma, 2008: 8). On HMS *Colossus* the synthetic net became torn and tangled within three months of deployment (Camidge, 2009: 170).
- B. It is highly unlikely that nets established over site 25C could remain buoyant for sufficient time to allow consistent sediment accumulation to occur due to effects of up to 2.0-knot currents and potential bottom fishing activities.

- C. Net mesh is susceptible to tearing and holes can become blocked with weed or growth, requiring the placement of a second layer of mesh over the former one. Such a technique is high maintenance and impractical for a remote deep-sea site.
- D. The 2012 environmental study of site 25C conducted by the University of St. Andrews established that the localised sediment composition is predominantly (up to 59%) very coarse sand (1-2mm) and gravel particles (>2mm). Finer than coarse sand (<0.5mm) comprised only c. 1-2% by volume of samples. These very coarse sediments may be predicted to prevent suspension and sand catchment. Low-lying sediment transfer close to the seabed (rather than through the water column) may be predicted to cause net collapse.
- E. The establishment of a net system requires Saturation diver access, which realities of safety and cost make inappropriate.

4.4.8 The laying of artificial sea grass over site 25C to align the long edge of netting mats perpendicular to the direction of currents to trap maximum sediment in floating fronds and stimulate site burial, as applied to some wrecks (*William Salthouse*, *James Matthews*, the Hårbølle wreck), has been considered. This process is also problematic:

- A. Experience from other wreck sites considers this system to be cumbersome to place with divers and fronds tend to become weighed down by sediment, failing to develop the preservative status (e.g., Swash Channel wreck). In strong currents sea grass fronds can lie down flat and become ineffectual at collecting sediment, and collected sediment can be scoured out.
- B. Mats are fastened by anchors penetrating 50cm into the seabed, which can damage underlying archaeology, and use intrusive iron fastenings c. 1m long that are also unsuitable for fragile wreck sites. Stratigraphy of less than 50cm seems to exist on the western flank of the *Victory* wreck site, which would make securing artificial sea grass infeasible.
- C. The laying of artificial sea grass is not proven to be workable for an environment such as the deep-sea wreck of the *Victory*. Given the very coarse nature of the site's sediments, it is highly questionable whether such fronds would be effective. Instead, they are likely to be problematic, probably by burrowing into the seabed and causing localised scouring.

4.4.9 The MHF has examined the application of geotextiles to the protection *in situ* of archaeological remains on site 25C, whereby finely woven or non-woven synthetic fabrics are used as physical barriers to protect organic remains against shipworm and by slowing down the deterioration of exposed and buried timbers. Research suggests that Terram 4000 (a thermally bonded non-woven geotextile composed of 70% polypropylene and 30% polyethylene) is effective at preventing the larvae of shipworm settling on wood (Zakynthos wreck, EU MoSS project HMS *Colossus*, Swash Channel wreck). The flexibility of the fabrics makes them suitable to mould around timbers. In trials the use of Terram 4000 outperformed the above methods in terms of sediment depth achieved. The use of geotextile is also the only system that has not shown acute diver maintenance issues (Camidge, 2009: 165, 170-1).

4.4.10 Although on-site trials on other shipwrecks have demonstrated that geotextiles can be extremely buoyant and may need wrapping around a metal rod or other method to add weight, theoretically this approach could be applied to the *Victory* site (practical imposition aside, such as sandbagging edges).

4.4.11 Insufficient surface hull remains are currently exposed on site 25C to warrant the application of this system. None of the above methods can preserve surface artefacts *in situ*.

4.4.12 The above case studies applied to shallow sites close to shore occur in very different environments to *Victory*. Any covering equipment adopted for the *Victory* site will be susceptible to the daily current that changes direction by 180° every six hours. This dynamic has serious repercussions for the durability of site stability equipment, which will be subjected to constant undercutting, scouring and movement.

4.4.13 Consideration of the possible options for the *in situ* preservation of the *Victory* wreck site in relation to localised archaeological formations, environment, safety issues, external pressures and the project's rescue and research objectives, has resulted in the following conclusions.

4.4.14 The most appropriate approach to manage the surface archaeology of the *Victory* site, maximising respect of its archaeological remains, is preservation by record through the recording, recovery, study, publication and display of its assemblages. To hope that covering methods will be functional and sustainable when confronted by trawling, illicit salvage potential and localised environment pressures does not respect the unique evidential value of site 25C.

4.4.15 Prior to conducting intrusive activities, it is not possible to predict the site's sediment stratigraphy, character or preservation levels of sub-surface hull structure and artefacts. Proposing definitive stabilisation policies is premature. Through the phased approach presented in this Project Design, should substantial organic remains be exposed beneath the seabed during fieldwork, which are considered vulnerable, the MHF will consider the merits of applying *in situ* stabilisation measures. This includes the mechanical or natural backfilling of trenches to former levels of sediment coverage and depths inaccessible to marine borers, and possibly a sediment drop (cf. Manders, 2011: 34). To these will be added considerations of the merits of subsea stabilisation techniques designed for ROV use in the pipeline industry, notably such as Submat Bitumen Mattresses.⁴

4.4.16 Upon completion of each fieldwork Phase a programme of site stabilisation, monitoring and protection will be proposed by the MHF in each report.

4.5 Research, Reports & Public Outreach

4.5.1 In line with the MHF's commitment to education and public outreach, eight scientific papers have been published detailing the *Victory*'s history, site formation, cannon assemblage and completed non-disturbance archaeological activities:

- Cunningham Dobson, N. and Kingsley, S., 'HMS *Victory*, a First-Rate Royal Navy Warship Lost in the English Channel, 1744. Preliminary Survey & Identification'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey. Deep-*

⁴ <http://www.slp-eng.com/Submat/Downloads/Submat%20Brochure.pdf>: pp. 5-6.

Sea Shipwrecks in the English Channel, Straits of Gibraltar & Atlantic Ocean (Oxbow Books, Oxford, 2010), 235-81.

- Cunningham Dobson, N. and Tolson, H., 'A Note on Human Remains from the Shipwreck of HMS *Victory*, 1744'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey. Deep-Sea Shipwrecks in the English Channel, Straits of Gibraltar & Atlantic Ocean* (Oxbow Books, Oxford, 2010), 281-88.
- Trollope, C., 'Brass Guns & Balchin's *Victory* (1744): the Background to their Casting'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey 2. Underwater Heritage Management & Deep-Sea Shipwrecks in the English Channel & Atlantic Ocean* (Oxford, 2011), 51-60.
- Van de Walle, F., 'Balchin's *Victory*: Bronze Cannon Conservation Report'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey 2. Underwater Heritage Management & Deep-Sea Shipwrecks in the English Channel & Atlantic Ocean* (Oxford, 2011), 61-69.
- Kingsley, S., Cunningham Dobson, N. and Van de Walle, F., 'Balchin's *Victory* (Site 25C): Shipwreck Monitoring & Cannon Impacts, 2008-2012', *OME Papers 24* (Tampa, Florida, 2012), 1-32.
- Seiffert, G., Cunningham Dobson, N., Van de Walle, F. and Kingsley, S., 'HMS *Victory* (Site 25C). Preliminary Results of the Non-Disturbance Shipwreck Survey, 2012', *OME Papers 31* (Tampa, Florida, 2013).
- Prave, A.R., Herd, D.A., Calder, A.C. and Allison, S.G., 'The Wreck of the First Rate Warship the *Victory*, Western English Channel: Site 25C Sediment Analysis', *OME Papers 33* (Tampa, Florida, 2013).
- González, J.A.M. and Lozano Guerra-Librero, C., 'Dynamics of Sediment Bedforms in the Western English Channel: the Wreck of the *Victory* (Site 25C) in Context', *OME Papers 34* (Tampa, Florida, 2013).

4.5.2 The MHF, Odyssey and Wreck Watch Int. developed and launched the *Victory* Deep-Sea Virtual Dive Trail in September 2013, which has been visited to date by 'virtual divers' from 122 countries (www.victory1744.org).

4.5.3 A collaborative scientific report presenting the marine biology of the *Victory* wreck site is under production with the University of St. Andrews.

4.5.4 A research programme focussing on the origin of the iron ballast recorded in Area F on *Victory* is currently being conducted in adherence with the Project Design Levels 5A.2-5A.3 research model. Results indicate that Miles Troughton manufactured the ballast for the admiralty at Sowley within the Beaulieu estate of the Duke of Montagu.

4.5.5 The research programme 'What Sunk *Victory*?' was initiated in 2013 to meet the Project Design's Levels 1.6-1.9 research model. This multi-layered, interdisciplinary project combines historical analysis with naval engineering profiling to examine myths of the warship's loss and concerns that the vessel was inadequately built.

5. PROJECT STATEMENT & OBJECTIVES

5.1 Heritage Asset Values

5.1.1 The *Victory* Shipwreck Project is a joint research and rescue project combining monitoring, non-disturbance survey and intrusive activities in a phased approach to mitigate against site loss and maximise understanding of a rare and marginalised resource.

5.1.2 The values of the *Victory* wreck site have been identified based on English Heritage's *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment* (English Heritage, 2008):

5.1.3 **Evidential.** Relating to the potential of the *Victory* to yield primary information about past human activity, this site is of national significance due to the uniqueness of remains (100 bronze cannon) and, depending on levels of preservation, the artefacts' ability to reflect social diversity in hierarchical shipborne life. Remains of the intact rudder are rare on British wrecks of the 18th and 19th centuries worldwide and are of high significance. The evidential values of the *Victory* are restricted by the absence of understanding of the site's sub-surface archaeological character, preservation and stratigraphy. Only two cannon have been recovered for study.

5.1.4 **Historical.** Relating to the ways in which the *Victory* can provide direct links to past people, events and aspects of life, the loss of this warship had a profound effect on the psyche of English society. The vessel is associated with renowned personalities (Admirals Sir John Norris and Sir John Balchin). Circumstantial documentary evidence for the wrecking event exists (analysis of log books from other ships in the homeward bound fleet).

5.1.5 **Aesthetic.** Relating to the ways in which people respond to the *Victory* through sensory and intellectual experience, the wreck's strength lies in its status as a rare example of an 18th-century First Rate English warship. She was the only three-decker First Rate built to the 1733 Proposed Establishment and a rare example of the Royal Navy's ultimate naval deterrent. Conservative in construction, in exterior design the *Victory* was the only British three-decker built with four complete tiers of quarter galleries, four rows of lights and three open balconies at the stern. She had an unusual entry port on the middle deck to starboard, possessed elaborate decoration across the sterncastle and prow, and was the last warship to retain a fifteenth pair of gunports (on the gundeck).⁵ Located outside territorial waters in deep seas, the ship's aesthetic values as a wreck site cannot be easily sustained or physically experienced by society at large.

5.1.6 **Communal.** Relating to the meanings of the *Victory* for the people who identify with it, and whose collective memory it holds, the ship retains important aspects of the collective memory of early Georgian Britain, bound up with concepts of national security, power and identity. The *Victory* has resonance for the descendants of the ship's crew and some inhabitants of the Channel Isles, who for centuries considered themselves the symbolic guardians of this lost ship.

5.1.7 **Instrumental.** Economic, educational, recreational and other benefits, which exist as a consequence of the cultural or natural heritage values of the *Victory*, have not been realised. Due to the wreck's inaccessibility, it cannot be visited as a dive

⁵ These features are visible on the three builders' models surviving of the *Victory*, of which the example in Cawdor Castle is most detailed.

site of historic interest. Without a programme of artefact recovery and targeted excavation, museum display and appreciation of the wreck's values is not feasible.

5.1.8 The project objectives adhere to Article 2.5 of the UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001), which specifies that the *in situ* preservation of underwater cultural heritage should be considered as the first option, but that “‘first option’ is not the same as ‘only option’, or ‘preferred option’”. Partial or total excavation may be necessary under certain circumstances and preferable for a number of reasons” (*Underwater Cultural Heritage and the Rules of the UNESCO 2001 Convention: a Manual*, edited by Th. Maarleveld, U. Guérin and B. Egger (UNESCO, 2013: 25).

5.1.9 The UNESCO Convention Rule 1 clarifies that activities directed at underwater cultural heritage can be authorised where they make a significant contribution to protection, a significant contribution to knowledge, or a significant contribution to enhancement.

5.1.10 Phased excavation in accordance with the *Victory* Project Design is in full compliance with UNESCO principles because:

5.1.11 Monitoring of *in situ* remains has been conducted and considered over a period of four years (Tables 1, 3-4). The potential of site 25C for *in situ* preservation as a first option has been assessed in view of a protective site management capacity and equally as a measure capable of facilitating knowledge procurement (section 4.4).

5.1.12 The site is at risk and has been impacted by fishing trawlers and illicit salvage on at least three identified occasions, culminating in the looting of a 4-ton cannon in summer 2011. Numerous guns have been documented as disturbed (scratched, moved up to 233m offsite and looted). In the absence of intrusive measures, site 25C will remain highly vulnerable to impacts, resulting in ongoing primary data loss. The recording, recovery, conservation and display of artefacts would represent a comprehensive contribution to the wreck's long-term protection.

5.1.13 The archaeological remains on the surface of site 25C do not permit the Project Design's analytical research framework to be met (section 5.3, tables 5-10). For this, targeted excavation of cultural remains is required. Excavation is also necessary to make a significant contribution to enhancement of knowledge through publication, education and public outreach.

5.2 Staged Investigation

5.2.1 The *Victory* Shipwreck Project is being conducted through a staged investigation:

- Stage 1: Assessment, Monitoring & Characterisation.
- Stage 2: Public Outreach.
- Stage 3: Recovery of At Risk Surface Artefacts.
- Stage 4: Targeted Trial Trench Excavation.
- Stage 5: Targeted Excavation.
- Stage 6: *In Situ* Protection.
- Stage 7: Post-Excavation Assessment.
- Stage 8: Conservation.
- Stage 9: Analysis & Research.
- Stage 10: Museum Display.
- Stage 11: Final Publication.

5.2.2 Stage 1 has been completed and discussed in extensive scientific publications (Kingsley *et al.*, 2012; Morales González and Lozano Guerra-Librero, 2013; Prave *et al.*, 2013; Seiffert *et al.*, 2013).

5.2.3 Stage 2 has been addressed through semi-popular magazine articles (*Current World Archaeology*, *Public Archaeology*) and primarily through the *Victory* Virtual Shipwreck Trail launched in September 2013 (www.victory1744.org). The trail will be updated with new data and video coverage as future fieldwork is completed.

5.2.4 Stages 3-11 are the subject of the current Project Design and are discussed in the relevant sections below.

5.3 Research Framework

5.3.1 A set of holistic research themes has been defined for combined assessment in the field and desk-based studies as central to realising the significances of the *Victory* as a shipwreck type-site for Early Georgian First Rate English warships (Tables 5-10).

5.3.2 The *Victory* is an immensely rare class of vessel. She was one of 20 First Rates built between 1682 and 1795,⁶ of which three foundered at sea (*Victory* 1744, *Royal George* 1782, *Ville de Paris* 1782). The rest were broken up (15) or burnt (1), while the core structure of *Victory* 1765 survives in Portsmouth Dockyards, but without its original artefact assemblages. Representing the only identified First Rate of 100 bronze guns surviving in the archaeological record the values of *Victory* 1744 are intimately tied to the warship's evidential value on the seabed in terms of its historical context and technological development.

5.3.3 Research into all aspects of the below research agenda will draw on the comparative results of worldwide surveys and excavations of other 18th- and early 19th-century English warships reflecting similarities and differences to *Victory* 1744, including the *Hazardous* (Sussex, 1706), *Maidstone* (Noirmoutier, France, 1747), *Sirius* (Norfolk Island, Australia, 1790) and *Colossus* (Silly Isles, 1798) (Owen, 1988, de Maisonneuve, 1992; Stanbury, 1998; Camidge, 2003; Camidge, 2005). Notably, HMS *Fowey* (Florida, 1748) and *Pomone* (Isle of Wight, 1811) contain comparative iron ballast (Tomalin *et al.*, 2000: 18; Skowronek and Fischer, 2009: 111-14), the *Invincible* will provide an important reference point for rigging (Bingeman, 2010), and the Brodie form of iron stoves associated with HMS *Swift* (Patagonia, 1770) and *De Braak* (Delaware, 1798) (Elkin *et al.*, 2007: 39, 49) will reveal structural differences to *Victory* 1744's brick-lined kitchen galley. Studies will also compare the results from *Victory* with the large-scale excavation in the English Channel of five French First Rates lost in 1692 during the Battle of the Hogue (L'Hour and Veyrat, 1998). No shipwreck parallels exist to *Victory*'s bronze cannon assemblage.

5.3.4 The *Victory* Shipwreck Project seeks to realise the site's evidential, historical, aesthetic, communal and instrumental significances through a research-oriented approach. The detailed research agenda compiled for the project to maximise respect, understanding and visualisation of the wreck for current and future generations is presented in Tables 5-10 and has been sub-divided into the following categories and levels:

⁶ Includes the ex-French prize *Ville de Paris* taken and re-commissioned by the British in 1782, before being wrecked later in the year off Newfoundland (Winfield, 2007: 9).

- Level 1: Life of *Victory* (Historical).
- Level 2: Site Environment.
- Level 3A: Shipborne Life (Historical).
- Level 3B: Shipborne Life (Evidential).
- Level 4A: Defence (Historical).
- Level 4B: Defence (Evidential).
- Level 5A: Ship Technology (Historical).
- Level 5B: Ship Technology (Evidential).
- Level 6: Loss of the *Royal George* (Historical Comparative Analysis).

5.3.5 The *Victory* Shipwreck Project’s research aims incorporate and develop those identified within the maritime archaeological research agenda for England (Dellino-Musgrave and Ransley, 2013: 166).

Level 1: Life of Victory – Table 5		
Level	Assessment	Method
1.1 Function	Naval & economic rationale for <i>Victory</i> ’s construction; naval role of First Rates	18 th -20 th century historical sources, academic literature; Admiralty records (incl. 1732 review of 1719 Establishment for First Rates)
1.2 Previous Use	<i>Victory</i> ’s naval history	
1.3 Repairs & Rebuilds	Evidence, reasons & implications for repairs & rebuilding	
1.4 Final Assignment July-October 1744	Chronology, military & economic rationale	
1.5 Gold Bullion Private Cargo	Comparative analysis of warships’ transport of Portuguese gold to England	Ships’ logs, consular documents, naval diaries for later 17 th & first half of 18 th century
1.6 Myth of the Casquets Sinking	Evidence for <i>Victory</i> ’s loss off the Channel Isles & reasons for misinterpretation	Admiralty records; Georgian newspapers
1.7 Causes of <i>Victory</i> ’s Sinking: Climatic	Great Storm of September/October 1744, Alderney lighthouse misuse	
1.8 Causes of <i>Victory</i> ’s Sinking: Environmental	Timber deficiency, dockyard planking & below decks ventilation mismanagement	Admiralty records, 18 th -century critiques; computer-generated modelling based on the ship’s lines & builder’s models
1.9 Causes of <i>Victory</i> ’s Sinking: Structural	Cannon ‘overcrowding’, top heavy scantling imbalance	

Table 5. Summary of research framework for the *Victory* Shipwreck Project.

Level 2: Site Environment – Table 6		
Level	Assessment	Method
2.1 Geological Setting	Sedimentological & geological context, site character & composition. Address issues of site/artefacts preservation & inform management options	Geophysical techniques, spatial recording, laboratory analysis of sediment samples outsourced to University of St. Andrews, Scotland
2.2 Marine Biology	Character, scale & importance of marine biology on the site in relation to marine oasis/reef effect	Collation of multiple on-site gridded documentary evidence (photomosaics, video coverage, still photography) outsourced for analysis to University of St. Andrews, Scotland
2.3 <i>In Situ</i> Preservation	Holistic research combining results of environmental & marine biological assessments with evidence for site change/stability	On-site visual and geophysical monitoring (2008-2012), studies of buried sacrificial wood & metal samples
2.4 Site-Formation Analysis	How wreck formed on seabed & subjected to post-depositional changes	Photomosaics & site surface plans examined in relation to builder's plans, models of <i>Victory</i> , comparisons with formations of other English warship wrecks. Special emphasis on distribution of guns, scattering versus contextuality (iron ballast configuration & distribution of cooking galley hearth bricks) & external impacts

Level 3: Shipborne Life (Historical & Evidential) – Table 7		
Level	Assessment	Method
3A.1 Personnel (Historical)	Social background, demography, press gangs, work/sleep structure, living conditions, discipline, diet	<i>Victory's</i> logs & logs of other ships in July-October 1744 fleet
3A.2 Command Structure (Historical)	Role of officers, special reference to Admirals Norris & Balchin, & Captain Faulkner	<i>Victory's</i> logs, Admiralty records, bibliographic literature
3A.3 Diet (Historical)	Victuals on First Rate warships, cooking & processing	17 th -18 th century sources, Admiralty records
3B.1 Social Conditions	Domestic assemblage composition as reflection of social diversity	Analysis of contexts, types & volumes of ceramic table & kitchenwares, glasswares, domestic assemblages through total sampling recovery
3B.2 Diet	Animal bones as evidence of diet & meat treatment	Excavation, contextual recording & recovery (as permissible)
3B.3 Food Preparation	Galley cooking area, copper kettle	
3B.4 Pathology	Human bone analyses for disease, stress, diet, shipboard life	

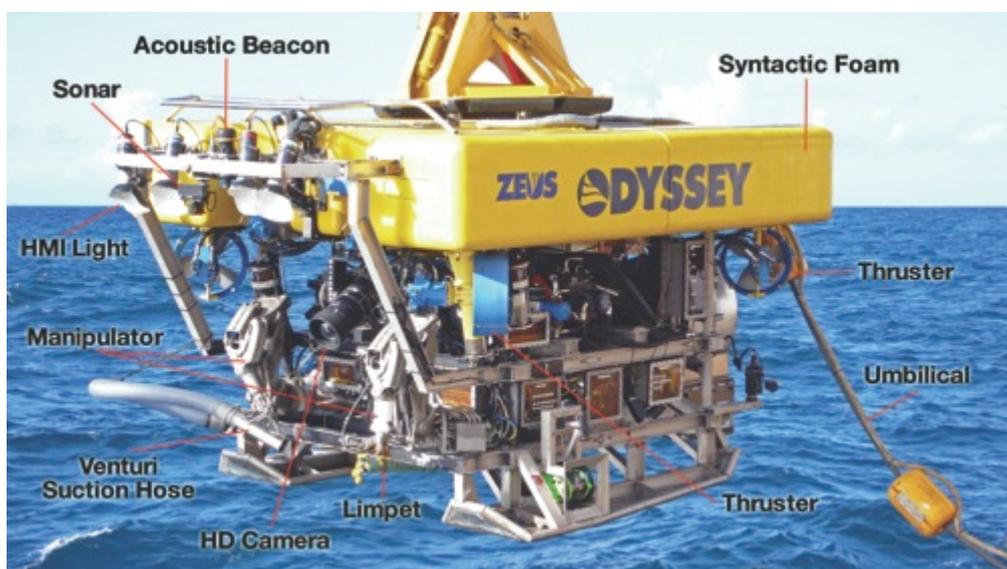
Tables 6-7. Summary of research framework for the *Victory* Shipwreck Project.

Level 4: Defence (Historical & Evidential) – Table 8		
Level	Assessment	Method
4A.1 Military Capacity (Historical)	Bronze guns & fittings: historical development, casting by Andrew Schalch at Woolwich, function, decline	18 th -century pamphlets, newspapers, archival documents in PRO, Kew, & Woolwich archives
4B.1 Military Capacity (Evidential)	Bronze guns & fittings: typology, royal arms stylistic analysis	Excavation, contextual recording & recovery
4B.2 Hand Arms	Swords, pistols & muskets	Excavation, contextual recording & recovery: analysis, typology

Level 5A-5B: Ship Technology (Historical & Evidential) – Table 9		
Level	Assessment	Method
5A.1 Hull Construction (Historical)	Build design methods & techniques	Analysis of 18 th -century historical sources, ships' plans & builders' models
5A.2 Ballast (Historical)	Kentledge manufacture for <i>Victory</i> & other naval vessels by Miles Troughton in Sowley within the Beaulieu estate of Duke of Montagu; relationship of gravel ballast in relation to iron	Admiralty records, 18 th -century historical texts, Beaulieu archives
5A.3 Ballast (Evidential)	Kentledge ballast locations, contexts & forms on <i>Victory</i>	Excavation, contextual recording & select recovery
5B.1 Hull	Archaeological evidence for ship construction	Excavation, contextual recording; comparisons with contemporary shipwrecks
5B.2 Species Types/Origins	Species & Dendro-chronological analysis	Excavation, contextual recording, select sampling
5B.3 Rigging	Archaeological evidence for bronze, iron & wood rigging	Excavation, contextual recording & recovery
5B.4 Rudder	Archaeological evidence of rudder construction (main piece, head, pintles, lead score lining, main piece sacrificial protection)	Excavation, contextual recording, select sampling
5B.5 Anchors	Archaeological evidence of anchor type and technology	Excavation, contextual recording

Level 6: Loss of the Royal George (Historical Comparative Analysis) – Table 10		
Level	Assessment	Method
6.1 Sinking	Background to the ship's loss	Admiralty & court martial records, 19 th -century salvage reports
6.2 Salvage	Evidence of shipborne life, ordnance composition	19 th -century salvage reports
6.3 Site Formation	Evidence of deterioration/stabilization (prior to use of explosives)	
6.4 Design Flaws	Evidence for comparative build design problems to <i>Victory</i>	Admiralty & court martial records, 18 th /19 th century historical critiques

Tables 8-10. Summary of research framework for the *Victory* Shipwreck Project.



Figs. 8-9. *Odyssey Explorer* research ship, and technological specifics of the ROV Zeus.

6. FIELD METHODOLOGY

6.1. Remotely-Operated Vehicle Fieldwork

6.1.1 Due to pressures of accessibility and safety, the *Victory* Shipwreck Project will use a remote-access methodology, whose technology has been tried and tested over ten years on multiple shipwrecks worldwide.

6.1.2 Operations will be directed from the 76m-long, 1,431-ton RV *Odyssey Explorer*, fully equipped to support deep-sea exploration. It has accommodation for a crew and staff of 41 people and contains deck-mounted deployment capability, umbilical cable and recovery equipment suitable for the operation of a work-class ROV system. The ship can work offshore for 60 days (Fig. 8).

6.1.3 The principal operational tool is Zeus, a 7.3 ton and 3.7 x 3.1 x 2.4m archaeologically-dedicated Remotely-Operated Vehicle (ROV) capable of replicating

shallow-water excavation, documentation and recovery actions. Zeus is designed to operate in strong currents down to depths of 2,500m through eight reversible hydraulic precision-controlled thrusters. The system has been rendered safe for archaeological environments through buoyancy compensation and a precision control system (Fig. 9).

6.1.4 For manipulation largely to position the dredge and operations' equipment, Zeus is fitted with two Schilling Conan seven-function 'master/slave' manipulator arms to either side of the front of the vehicle with a reach of 1.79m, a working arc of 120° and a lifting capacity of 170kg at full extension. A master/slave feature permits the manipulator arms to duplicate in seabed operations the movements of the operator on the research ship.

6.1.5 For stratigraphic excavation, gentle context 'dusting'⁷ and artefact recovery, Zeus possesses an integrated, venturi-pump operated sediment dredging system, specialised sediment sifting and collection device (SeRF) and a limpet suction tool.

6.1.6 SeRF meets the challenge of separating very small finds and ecofacts from sediments during contextual excavation by dedicated collection and sieving in an enclosed mesh box structure built onto the rear of the ROV.

6.1.7 The limpet suction device consists of a soft, bellows-shaped tube with a small suction pad (changeable from 2-10cm diameter) at the distal end. The assembly is fitted to the port manipulator and powered by the venturi pump. The pressure exerted to recover an artefact is suction sensitive and changeable in real time by the ROV operation's team. The limpet is used primarily to recover delicate artefacts (glass and ceramics). When equipped with a large suction pad it can lift objects weighing 45kg or more at maximum capacity.

6.1.8 Zeus is fitted with seven cameras. Five are video cameras used by the ROV pilot to monitor the vehicle's position and consist of a top umbilical monitoring camera (the 'umbilical cam'), two pan-and-tilt cameras on the stern (the 'lower pan-and-tilt' and the 'utility cam'), a lower pan-and-tilt camera on the bow of the vehicle (the 'pilot cam'), and a pan-and-tilt vertical camera. Two others are dedicated to archaeological recording, one video and one still.

6.1.9 The primary source of navigation on the ROV is a Sonardyne beacon that transmits an acoustic signal to a transducer head mounted on a pole through the vessel's hull. Navigation of the ROV is facilitated through the use of a Simrad altimeter, a laser ring gyro (Ixsea), a Sonardyne SPRINT Inertial Navigation System and an RDI doppler current profiler. For survey the ROV is fitted with a Kongsberg Simrad Mesotech 6000m Digital Sonar.

6.1.10 The ROV operation's team consists of four to six interchangeable personnel: an Operations Project Manager, ROV Supervisor, a pilot and a co-pilot, who conduct ROV operations under the direction of the Archaeology Project Manager. Data loggers document and record all video, audio and data information of each event on-site, such as the discovery of an artefact, its placement in a bucket, and transfer of basket containers to 4Plexes. Locational data for each event are automatically recorded.

⁷ Dusting is a term applied by Odyssey, which refers to the gentle suction or blowing of sediments to expose delicate artefacts or structural remains. It is the equivalent of light hand fanning in traditional marine archaeology.

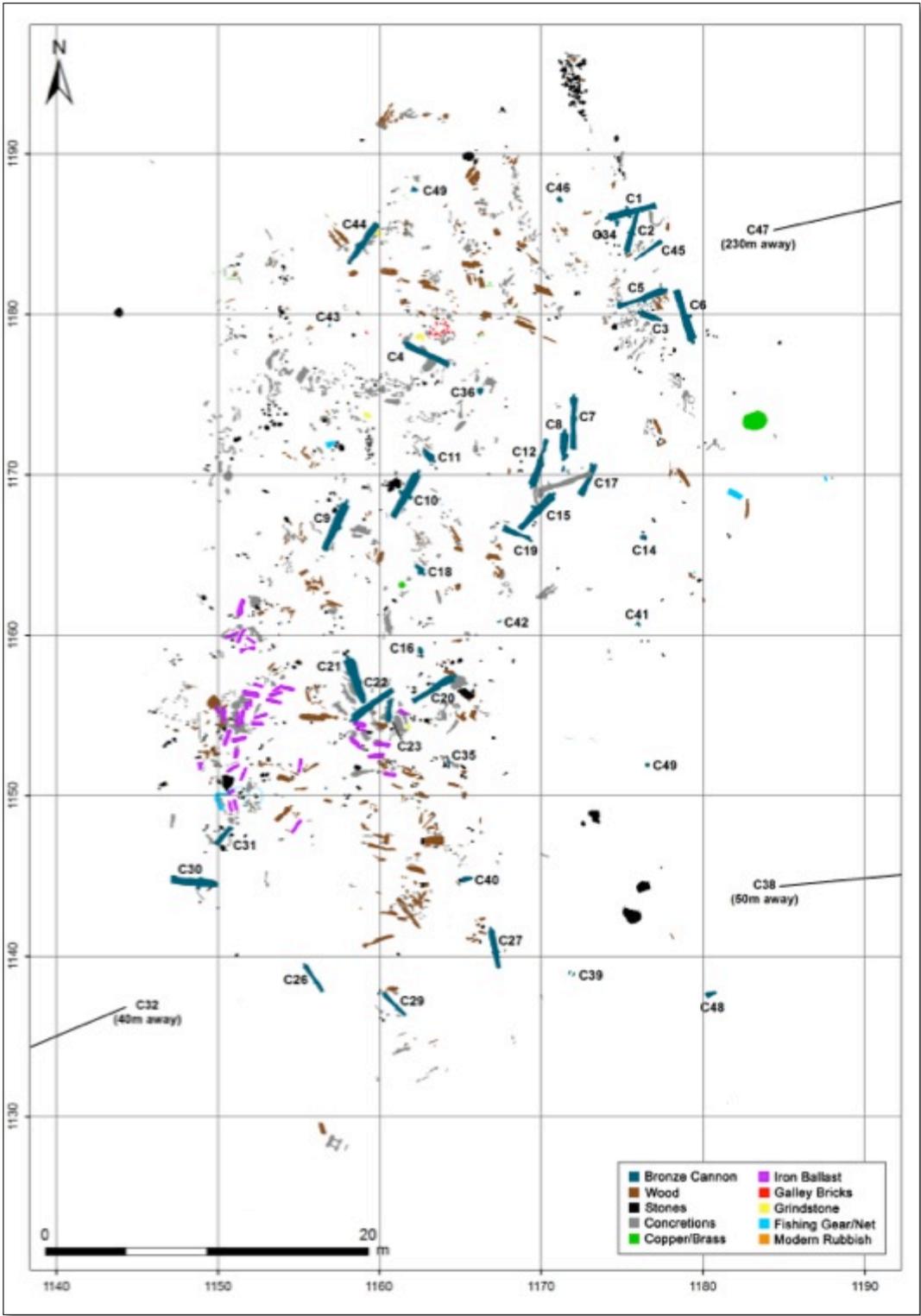


Fig. 10. The site 25C virtual grid established across an area of 2 x 2km, sub-dividable down to 1 x 1m squares for contextual recording.

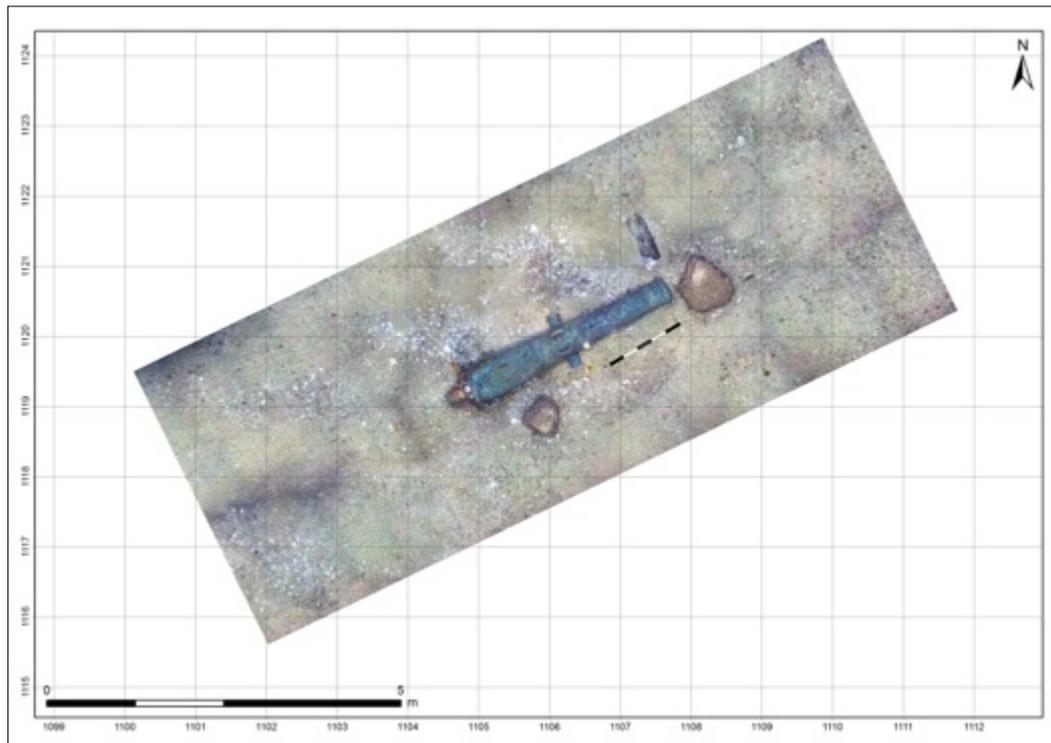


Fig. 11. An example of offsite cannon C32 within its 1 x 1m virtual recording grid.

6.2 Site Surveying

6.2.1 Surveying on the *Victory* shipwreck will be based on an advanced technological positioning system. Three main electronic navigation aids work together to provide accurate positioning and measurement: GPS, Ultra Short Baseline (USBL) and Long Base Line (LBL). This hardware works in conjunction with a navigation software programme called 'WinFrog'. Integration of these positioning and acoustic systems, along with custom proprietary computer software, enables tracking of the work platform to a position above the site, the ROV to the seabed, when precise measurements can be taken.

6.2.2 The *Victory* project will utilise a Sonardyne SPRINT (Subsea Precision Reference Inertial Navigation Technology) system, an acoustically aided inertial navigation package for subsea vehicles that provides maximum accuracy during surveying and recording.⁸ The system extends the operating limits of Ultra Short Base Line (USBL) and can dramatically improve the operational efficiency of Long Base Line (LBL) by using sparse arrays. SPRINT makes optimal use of acoustic aiding data from acoustic positioning and other sensors, such as a Doppler velocity log (DVL) and pressure sensors. This improves position accuracy, precision and integrity in any water depth, while reducing operational time.

6.2.3 The Sonardyne SPRINT system facilitates repeatability of positioning between site visits because all survey measurements can be referenced to offsite permanent datums kept constant throughout the project. Compared to conventional LBL operations, INS permits precision recording to an intra-site relative accuracy of 5-15cm. Artefact and structure measurements yield precise dimensions. The enhanced

⁸ This operational tool is more colloquially known as INS (Inertial Navigation System) in the subsea industry.

positioning capability ensures that the chances of gaps occurring during photomosaic production are almost non-existent, and it also provides better geospatial accuracy within the photomosaic.

Code	Material
BN	Bone
BZ	Bronze
CN	Concretion
CP	Cuprous
CR	Ceramic
GL	Glass
LD	Lead
OR	Organic
PL	Plank
PT	Pewter
ST	Stone
UD	Unidentified
WD	Wood

Table 11. Codes for the recording of features and structures on site 25C.

6.3 Recording Protocols

6.3.1 During the physical recording of surface structural remains and trench contents the following system will be adhered to on the *Victory* wreck site.

6.3.2 All ROV and archaeological activities are recorded onto both High Definition and Standard Definition DVD. The result is a complete record that provides total coverage of operations. Multiple formats of photography are employed to generate a comprehensive *in situ* graphic record. All records described in the methodology will be integrated in a Microsoft Access database. The data relative to position and observation will be processed and recorded for accurate contextual interpretations throughout all archaeological activities.

6.3.3 The main geospatial means of recording the exact positions of structures, artefacts and trenches on site 25C is through the virtual grid (the underwater analogue to excavation grids used in land archaeology). This was imposed as 1 x 1m squares during the 2012 non-disturbance Phase 1A activities across an area of 2 x 2km that corresponds to the total area examined during the side-scan sonar survey. The wreck mound is positioned at the centre of the virtual grid (Figs. 10-11).

6.3.4 During fieldwork the index grid is displayed permanently and in real time as an overlay on the main navigation screen. Located in the Offline Room directly next to the live ROV video feed, this screen is the main reference tool through which the Archaeological Project Managers direct dives. The navigation screen (driven by WinFrog software) displays the index grid, marked wreck site waypoints, and a real-time virtual model of the ROV's position. The exact working positions of both manipulator arms are plotted in real time.

6.3.5 Intra-site the wreck has been sub-divided into seven archaeological zones, Areas A-G, based on surface manifestations, a system that will be expanded as necessary when operations proceed and used for artefact/trench descriptions.

6.3.6 Trenches and Sub-Bottom Imaging (SBI) units will be provided with a unique numerical label, which is consecutive intra-site commencing with Trench 1 (T-001) and Sub-Bottom Imaging anomaly SBI-001.

6.3.7 Upon exposure within trenches, structural elements (timbers, planking, wooden features, concretions etc.) will be provided with a trench-specific unique code, e.g. the first plank in Trench 1 would be coded T001-PL001. Discontinuous elements of the same plank will be labelled T001-PL001a, T001-PL001b etc. Structure/object labels will not be consecutive across the site, but re-commence in new trenches from '1', always prefixed by the Trench number. Thus, T002-CN001 would be used for the first concretion recorded in Trench 2. Code labels are material specific (Table 11).

6.3.8 Where wood remains are identified, the labelling system will follow the structure of J.R. Steffy, *Wooden Ship Building and the Interpretation of Shipwrecks* (Texas A&M University Press, 1994) with the following abbreviations:

- CL: ceiling plank
- KL: keel
- KN: knees
- PL: plank
- SP: portside strake
- SS: starboard strake
- ST: strake (when unknown if from portside or starboard).

6.3.9 Recorded data are entered automatically into the DataLog[®] software system (compatible with Microsoft 'Access' software) to record all events and activities. DataLog receives and processes data from the ROV in real time. All activities, artefact manipulations and archaeological and environmental observations are recorded through the selection of choices from drop-down menus. The system is manned 24 hours a day when the ROV is in the water and automatically logs all events, including time, date, dive number and X, Y, Z coordinates of any activity.

6.3.10 DataLog entries are registered in the following order:

- Target Name
- Event Number
- Dive Number
- Target Dive No.
- Event Date
- Event Time
- Stills No.
- Stills Name
- DVD No.
- DVD Name
- UTM Zone
- CRP Grid X
- CRP Grid Y
- PortManipulatorX
- PortManipulatorY
- PortManipulatorZ
- ROV Heading
- ROV Depth
- ROV Altitude
- ROV Pitch

- ROV Roll
- Archaeologist Name
- Datalog Operator Name

6.3.11 The exception to the automatic entries made into DataLog is the 'Comment' category, which is written during a dive by the datalogger, and 'Arch Commentary' field notes written by the shift archaeologist and incorporated into the DataLog programme. Data recorded manually during dives includes:

- Opening trench depth.
- Artefact and structure numbers.
- Depth to specific artefact or structure.
- Total trench depth.
- Length, width and thicknesses of artefacts and structures.

6.3.12 All DataLog files are converted from software as an Excel sheet for post-project processing and analysis.

6.3.13 Dimensions of artefacts and structures, and distances between them within a trench, plus artefact/structure trench depths, will be recorded using the ROV Zeus's manipulator position converter kit (see section 6.4).

6.3.14 The ROV camera zoom facility will record unique features present on artefacts, planking and other elements, including nail and stain stations, after a scale bar is placed in close proximity to the subject where possible.

6.3.15 Where appropriate, loose or broken sections from representative samples of coherent planks/timbers will be recovered for species analysis (in accordance with research agenda 1.8 and 5B.2, Tables 5, 9).

6.3.16 Georeferenced photomosaics will be produced of every trench, pre- and post-disturbance. This data will serve as the basis for producing site plans in either Photoshop or ArcGIS and assist in analysing trench dimensions.

6.3.17 After the completion of trench excavation, or trenching of a Sub-Bottom Imaging (SBI) hit, a Trench Log will be written by the shift archaeologist summarising all events and the character of each trench and its contents. This record includes all measurements and related photograph numbers, and an annotated micro-photomosaic image.

6.3.18 The above recording protocols will permit interpretation of the hull and archaeological remains to Level 1 and Level 2 (cf. *Standard and Guidance for Nautical Archaeological Recording and Reconstruction*, IfA 2008: 7). Depending on levels of hull preservation encountered, elements of site 25C will be subjected to Level 3 recording.

6.4 ROV Positional Recording

6.4.1 The ROV Zeus is configured around two Conan 7P Manipulator arms built by Schilling Robotics. This system has a built-in position converter kit that uses a custom Conan 7P junction box and slave cable to extract positional data from the slave arm manipulator mounted on Zeus, which reports the X, Y and Z coordinates of a jaw-mounted tool relative to a reference point in the slave arm's azimuth axis.

6.4.2 For measuring purposes Odyssey has mounted a stainless steel bar onto the ROV's port arm that has been measured from the default jaw reference point to the end of the small steel bar; the bar is exactly in line with the X axis. To the starboard arm is welded a small point that is also exactly in line with the X axis utilised to obtain precise measurements.

6.4.3 The base position (Static Offsets) has been measured for each arm in relation to the Central Reference Point (CRP) on the ROV, as well as the angle that the manipulators have been mounted on the ROV, which is 37° inward from directly forward. These offsets and measurements have been applied and integrated into a piece of software that was developed by Odyssey. Using trigonometry, ROV heading, ROV motion and ROV positional data to calculate the exact position for the end point of each arm in the software is key to the system and software's success.

6.4.4 Knowing the exact positions for the base of each arm in relation to the CRP on the vehicle is essential to obtain consistently accurate and precise measurements that are repeatable. This is accomplished by using an LBL array to assist the INS mounted on the ROV. Whenever an important measurement is being taken, the surveyor can lock the ROV position and isolate the manipulators so that the only dynamic aspect in the calculation will be their movement.

6.4.5 The accuracy of the manipulators' measurements has been proven and is constantly checked by measuring modern items on the sea floor through this process and then bringing the same items to the surface for repeat measurement with a tape measure. The measurement comparison is always very tight.

6.5 Cannon & Artefact Recovery

6.5.1 The bronze cannon designated for recovery in Phase 3 will be secured on the sea bottom and subsequently recovered to the surface using the following techniques.

6.5.2 A cannon will be harnessed using pre-prepared polyester strops (3.5m long, 149mm wide and rated for a Safe Working Load of 5 tonnes). Two strops are required for each cannon-lifting bridle, which will be looped through an 11.8-tonne master link ring. While fitting out a lifting bridle prior to deployment, an end of each strop is looped back on itself creating an approximate 1.5m-diameter loop. To help the loop retain its shape, the width of the strop is doubled and cable tied. A pre-determined cannon number is permanently marked in two places on each strop, giving the bridle an individual identity.

6.5.3 Once on the seabed the bridle is collected by the ROV and taken to a cannon that has had sediment removed from the cascabel and muzzle ends. In some cases the ROV will be able to slide the looped ends of the bridle along the gun and in other situations the use of a custom-tooled threading tool will be required to secure the strops around the gun.

6.5.4 The master link is the lifting point on the bridle, to which the lift line from the research vessel is attached via a 6.8-tonne Crosby open sorting hook. This is connected subsea by the ROV after the bridle has been securely placed on the cannon. The lifting line is 12-tonne Dyneema rope with a small clump weight and a USBL acoustic beacon fitted above the hook to enable its position to be continuously recorded.

6.5.5 The lift will be achieved using the ship's aft deck tugger winch (4.5 tonnes), the A-frame and a lifting block rated to 30 tonnes. The lift and transit of the cannon

through the water column will be tracked acoustically and monitored via the ROV High Definition video camera. Continuous communication will be maintained between the archeologist, the ROV pilot, surveyor and the deck crew throughout the lift.

6.5.6 Any non-cannon artefacts recovered during the Phase 3 activities will be placed into numbered baskets and recovered in 4Plex storage units of various sizes, as appropriate subdivided, cushioned and equipped with closable lids.

6.5.7 During the Phase 3-6 activities, disarticulated wood that is disturbed will be relocated after recording and relevant sampling to Offsite Burial Pits. These will be cut east of the wreck to depths of 1.5m minimum to sustain anaerobic conditions in depths not vulnerable to marine-boring bivalves.

6.6 Artefact Recording

6.6.1 For shipboard finds' recording as soon as artefacts are recovered, the *Victory* Shipwreck Project will use proprietary software developed by Odyssey. The Artifact Inventory tracks the history of all artefacts from pre-disturbance contexts to recovery (Fig. 12).

6.6.2 Artefacts are catalogued with unique identification numbers according to medium (class), dimensions, description, photography, conservation history and current location, amongst other recording options, and yield Archaeological Finds Sheets (Figs. 13-14).

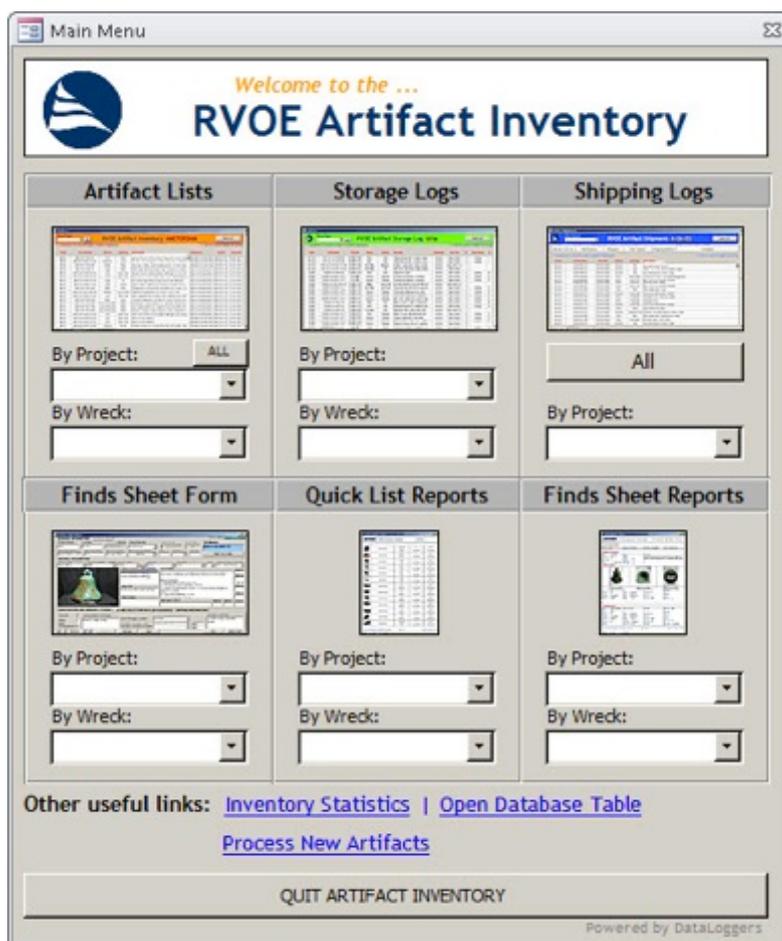


Fig. 12. The Artifact Inventory recording and tracking system to be used for the *Victory* Shipwreck Project.

Artifact Finds Sheet

Artifact Status: **Shipped**

GENERAL INFORMATION

Project Name: Atlas SS Target Name: MUN-T1M25c-1 Wreck Name: MUN-B TAG Date (dbclick): 17-Oct-2008 Sheet filled By: Neil Dobson TAG Number: **MUN-B-08-0004-OE**

Artifact ID (DataL): 20081011037887 Recovery Dive: 514 Recovery Date: 17-Oct-2008 Recovery Container: Other Trip: Partition: Bucket: PRINT TAG LABEL

ARTIFACT DESCRIPTION

Artifact Type: Ordnance Artifact Subtype: Bronze Cannon TAG: Green Material: Bronze Structure: Cast Class: U Classification Authority: Neil Dobson

Artifact Pictures (View HighRes):
 MUN-B-08-ARCH-S-0020.jpg
 MUN-B-08-ARCH-S-0010.jpg
 MUN-B-08-ARCH-S-0016.jpg

Description: Bronze 42-pdr cannon, George I., good condition, dolphins intact, bore empty with light concretions. Base ring engraving. Letters visible: "SCHALCH FACIT 1726". Total length of cannon 6" longer than historical records. Trunnion diameter 17.5 cm, bore diameter 17.5 cm. Overall 22 measurements were taken, see separate report. Cannon not weighed due to sea conditions

Length cm: 3.40
 Width cm:
 Height cm:
 M.Dia cm:
 T.Dia cm:
 B.Dia cm:

Alternative Name: Weight gr: Depth cm: B.Dia cm:

CONSERVATION AND ONBOARD STORAGE | **ID AND COLLECTION DATA (DATALOGGER)** | **SHIPPING INFORMATION**

Washed: Conservation Comment: Stored in fresh water Deck Storage Location: Deck Tank Storage Container Type: No Storage Comment: Fabricated iron container, painted, rubber mat

Dried: Photographed: Storage Container Subtype: No

Navigation: Browse SEARCH PREVIEW PRINT EXIT SELECT NEXT

R/VOE Artifact Inventory
Archaeological Finds Sheet TAG Number: **MUN-B-08-0004-OE**

General Information

Project: Atlas Site: MUN-T1M25c-1 TAG Date: 17-Oct-2008 TAG by: Neil Dobson

Artifact Description

Type: Ordnance	Length: 3.40	Description: Bronze 42-pdr cannon, George I., good condition, dolphins intact, bore empty with light concretions. Base ring engraving. Letters visible: "SCHALCH FACIT 1726". Total length of cannon 6" longer than historical records. Trunnion diameter 17.5 cm, bore diameter 17.5 cm. Overall 22 measurements were taken, see separate report. Cannon not weighed due to sea conditions
Subtype: Bronze Cannon	Width:	
Alt. Name:	Height:	
Class: U / Neil Dobson	Max Diam:	
Material: Bronze	Top Diam:	
Color: Green	Base Diam:	
Structure: Cast	Depth:	
	Weight:	

(All dimensions in cm or gram)

Artifact Images

Full view cannon with scale and tag number: MUN-B-08-ARCH-S-0020.jpg
 Top view of dolphins: MUN-B-08-ARCH-S-0010.jpg
 Side view George I crest: MUN-B-08-ARCH-S-0016.jpg

Onboard Treatment

Washed: Dried: Other: Photographed:

Conservation Comment: Stored in fresh water

Deck Stor.: Deck Tank
 Container: No
 Subcont.: No
 Storage Comment: Fabricated iron container, painted, rubber mat

Shipping Information

Left ship: 22-Oct-2008
 Destination: Portsmouth Naval Dockyard
 Ship. Meth: Truck
 Donator: Neil Dobson
 Recipient: Driver
 Ship. ID: ATL-08-07
 Shipping Comment:

Collection Data

ArtID: 20081011037887	ID Com.: BC-33	Coll.Com: BC-33	Rec.Con: Other
ID Ev. #: 37887	GridC: ---	Coll.DVD: 380	Con.Trip: ---
ID Dive: 508	GridY: ---	Coll.HD: 213	Partition: ---
ID Date: 11-Oct-2008	Depth: 78.54	Coll.Ev.#: 39057	Bucket: ---
ID Time: 12:25:02	Coll.Date: 17-Oct-2008	Coll.Dive: 514	Rec.Dive: 514
ID DVD: 341	Coll.Tim: 13:46:51	ROVShl: ---	Rec.Date: 17-Oct-2008
ID HD: 187			

Odyssey Marine Exploration - Archaeological Finds Sheet
 Printed: 15-Feb-2009 7:08:51:08

Figs. 13-14. The Artifact Inventory's 'General Information' recording menu (top) and an Archaeological Finds Sheet generated for 42-pounder gun C33 recovered in October 2008.

7. PHASED INVESTIGATION

7.1 Introduction

7.1.1 A phased approach has been adopted for the *Victory* Shipwreck Project whereby fieldwork will be delineated and assessed based on results presented in Progress Reports prior to subsequent phases commencing. Eight distinct fieldwork phases have been allocated:

- Phase 1A – Non-Disturbance
- Phase 1B – Non-Disturbance
- Phase 2 – Non-Disturbance Environmental & Marine Biological Assessments
- Phase 3 – Recovery Surface Cannon & Artefacts at Risk
- Phase 4 – Targeted Trial Excavation
- Phase 5 – Cooking Galley Targeted Excavation
- Phase 6 – Ongoing Targeted Excavation
- Phase 7 – Dendrochronology & Wood Sampling
- Phase 8 – Post-Excavation Site Stabilisation

7.1.2 Phase 1A, 1B and 2 non-disturbance activities were conducted in 2012 and a summary report of the activities has been published (Seiffert *et al.*, 2013). Two further reports addressing the site's sediments and bedforms have been produced in collaboration with the University of St. Andrews (Prave *et al.*, 2013) and the University of Huelva, Spain (Morales González and Lozano Guerra-Librero, 2013). Analysis of the results of the Phase 2 marine biological survey is ongoing.

7.1.3 The Phase 1A burial of modern sacrificial materials 70m northeast and offsite from the wreck has not been completed. The first frame is required to be recovered immediately upon acceptance of this Project Design.

7.2 Phase 3: Recovery of Surface Cannon & Artefacts at Risk

7.2.1 Phase 3 requires all cannon and surface artefacts at risk of illicit salvage, fishing trawler damage or displacement to be recovered (Figs. 15-19). The concept (developed in *HMS Victory, 1744 (Site 25C) – Project Design: Revision A*, June 2012) prioritises a methodology based on least intrusion. Activities will proceed in five stages from offsite to onsite and from the site periphery to its centre:

7.2.2 Stage 1 (Offsite): two guns (C32, C47) and surface artefacts located offsite, plus examination of 13 linear Sub-Bottom Imaging anomalies classified as Cannon Shaped Returns. 11 lie between depths of 0-20cm (84.6%) (Fig. 15).

7.2.3 Stage 2 (On-Site Wreck Periphery): 13 individual guns and surface artefacts visible (Area B2: C14, C41, copper kettle K1; Area C2: C44, C49; Area F: C30, C31; Area G: C24, C26, C27, C29, C39, C40, C48) (Fig. 16).

7.2.4 Stage 3 (Grouped Gun Clusters On-Site): 29 cannon and surface artefacts (Area A: C1, C2, C3, C5, C6, C34, C45, C46; Area B1: C7, C8, C12, C15, C17, C19, C37, C42; Area C1: C4, C43; Area D: C9, C10, C11, C16, C18; Area E: C20, C21, C22, C23, C35, C50) (Fig. 17).

7.2.5 Stage 4: potential near-surface cannon identified as 34 linear Sub-Bottom Imaging anomalies on-site within the contours of the visible wreck mound in areas of highly mobile sediments. Eight are essentially surface features (23.5%) and 23 covered by 10-20cm of sediment (67.6%) (Fig. 18).

7.2.6 Stage 5: potential near-surface cannon identified offsite as 28 linear Sub-Bottom Imaging anomalies due south and southeast of the visible wreck mound in areas of highly mobile sediments. Nine are essentially surface features (32.1%), another nine are covered by 10-20cm of sediment (32.1%), and six lie in depths of 30cm (21.4%) (Fig. 19).

7.2.7 All activities will respect archaeological contexts as a priority in line with Rule 6 of the UNESCO Convention. Some guns are anticipated to be conceivably contextualised with carriage remains, planking, dense concretions containing artefacts and other material culture. As traps for artefact accumulation, and as sealing layers that might pin cultural remains in position, the following best practice policy will be followed.

7.2.8 The removal of mobile sediment accumulation around cannon will be obligatory to release them from the seabed for recovery and to prevent potentially damaging any archaeology buried below cannon.

7.2.9 All archaeological features exposed below each cannon in a contextual relationship will be documented and recorded to understand their archaeological associations.

7.2.10 The scope of work will include the recording and recovery of all surface and near-surface material (guns, rigging, domestic assemblage, small finds) considered to be at risk.

7.2.11 Artefacts exposed that are considered to be of significance, and deemed at risk, will be placed in a secure location for recovery.

7.2.12 Where complex archaeology is encountered in the context of a cannon/s, the area of analysis will be designated as a trench to facilitate optimum recording.

7.2.13 Reports detailing all activities relating to each of the five distinct stages will be presented following the fieldwork. The commencement of subsequent phases would be dictated by the MHF.

7.3 Phase 4: Targeted Trial Excavation

7.3.1 Phase 4 involves the targeted trial excavation of a select number of trenches to assess the site's archaeological stratigraphy and artefact and hull preservation levels, in accordance with research agenda 2.1 and 2.4 (Table 6). Fieldwork will proceed in this phase only down to the upper surface level of any lightly buried archaeological remains, and will not include the removal of any structural remains. No Stratum 2 cultural materials will be disturbed below the upper layer of mobile sterile sediments (Stratum 1), which are naturally disturbed on a continuous daily basis.

7.3.2 As standard the following sequence of recording will be undertaken:

- i. Record and document surface archaeology (video, photography, ROV measurements).
- ii. Pre-disturbance micro-photomosaic production.
- iii. Remove surface sediments and record (video, photography, ROV measurements).
- iv. Vertical photomosaic of the trench.
- v. Horizontal photography of cross-section, as appropriate.

- vi. Record and measure individual section strata, including depths, geology and contexts.
- vii Recover artefacts, as appropriate.
- viii Wood and ecofacts sampling, as appropriate.

7.3.3 The following strategic targeted trenches have been identified for examination in Phase 4 (Fig. 20).

7.3.4 Re-excavation of intact anchor A2, a partial surface feature, examined in preliminary manner in 2008 16m offsite north of the wreck mound (grid coordinates 1193/1202) (Phase 4A, research agenda 5B.5: Table 9) (Fig. 20, 4A).

7.3.5 Re-excavation of the rudder, a partial surface feature, examined in preliminary manner in 2008 to the site's southeast (grid coordinates 1159/1128) (Phase 4B, research agenda 5B.4: Table 9) (Fig. 20, 4B).

7.3.6 A 3 x 3m trench around the surface copper kettle K1 (Area B2: grid coordinates 1184/1173), a probable sterile zone selected for minimal disturbance trial excavation to assess stratigraphy and preservation levels east of the site (Phase 4C, research agenda 3B.3: Table 7) (Fig. 20, 4C).

7.3.7 A 5 x 3m trench in Area F across the surface iron ballast blocks to the southwest of the site to quantify the surface volume of iron ballast, assess whether the ballast's position corresponds to an underlying keel line, and to record the depth of any structure and site stratigraphy (grid coordinates 1148/1150.5) (Phase 4D, research agenda 5A.3: Table 9) (Fig. 20, 4D).

7.3.8 A 4 x 2m trench in the visually sterile area on the site's northwest flank (grid coordinates 1140.2/1180.1) to assess whether the visual absence of archaeology is accurate (Phase 4E, research agenda 2.4: Table 6) (Fig. 20, 4E).

7.3.9 A 5 x 2m trench between the rudder and southwestern extremity of the visible wreck site to examine stratigraphy and preservation levels (grid coordinates 1161/1134) (Phase 4F, research agenda 2.4: Table 6) (Fig. 20, 4F).

7.3.10 Upon the completion of the Phase 4 activities a Progress Report will be submitted to the MHF with recommendations for future phases.

7.4 Phase 5: Cooking Galley Targeted Excavation

7.4.1 Phase 5 focuses on surface remains clustered around cannon C4 and grinding stone S1 within Area C1. A dense concentration of intact and fragmentary rectangular red bricks, as well as a cupreous tap with a handle resembling a fitting attached to a copper kettle, is currently interpreted as remains of the warship's cooking galley. A Phase 5 trench (centred on grid coordinates 1164/1176) will be targeted to determine whether Area C1 correlates with the ship's cooking galley and to address research agenda Levels 2.4, 3B.1, 3B.2 and 3B.3 (Social Conditions, Diet and Food Preparation, Tables 6-7) (Fig. 20, 5).

7.4.2 Targeted analysis of this area will be necessary to assess the contextual relationship and stratigraphy of surface cannon C4, C36, C43 and C51. Since the kitchen was located forward in the middle deck of First Rates under the forecastle (Goodwin, 1987: 160; Lavery 1987: 196), these guns may be interpreted tentatively as middle or lower deck portside guns onto which the cooking hearth collapsed. Confirmation of this theory will contribute to the Level 2.3-2.4 assessment of the site formation and stratigraphy.

7.4.3. The targeted analysis will examine the already exposed surface archaeology and will not disturb by removal or clearance any structural remains, other than wood and ecofact samples, as appropriate. Fieldwork will proceed in this phase only down to the upper surface level of any lightly buried archaeological remains, and will not include the removal of any structural remains. No Stratum 2 cultural materials will be disturbed below the upper layer of mobile sterile sediments (Stratum 1), which are naturally disturbed on a continuous daily basis.

7.4.4 Upon the completion of the Phase 5 activities a Progress Report will be submitted to the MHF with detailed recommendations for future phases. These will dictate plans and specify rationale for ongoing targeted excavation in Phase 6.

7.5 Phase 7: Dendrochronology

7.5.1 Laid down in Portsmouth dockyard for construction in 1726 and launched in 1737, the chronological parameters of the *Victory*'s construction are historically verified. Additional ship construction data may be obtainable through a dendrochronological programme aimed at addressing the following issues:

7.5.2 *Victory* was a rebuild of the *Royal James*. Tree ring sampling of the keel members and floor timbers, if identified, may clarify whether sections of the lower hull were recycled from this older vessel (built 1675, dismantled 1721) (research agenda 5B.2, Table 9).

7.5.3 Dendrochronological analysis may provide further evidence about the seasoning, stockpiling, repairs and reuse of timbers selected for the *Victory*. This is especially significant in light of historical evidence that this period coincided with a sustained positive phase of climatic fluctuations in the North Atlantic Oscillation, when mild winters hindered wood seasoning, and because the period witnessed the ill management in shipyards of timber storage and rotation for use.

7.5.4 Dendroprovenancing may reveal where specific timber elements derived from and provide information about timber resources and their management. Analyses may clarify whether the historically attested shortages of timber from the New Forest affected the construction of the *Victory* and whether inferior or Baltic wood was exploited instead.

7.5.5 A programme of dendrochronological sampling may be pursued in Phases 4-5 depending on the preservative conditions encountered during the intrusive activities. Sampling will ultimately depend on levels of hull structure preservation encountered and must be consistent with the policy of minimal site intrusion. It must also be borne in mind that the usefulness of a sample depends on its quality. Timbers with no bark or sapwood only provide limited information, and broken samples are often unusable since the ring sequence will not be continuous.⁹

7.5.6 Organic remains and ecofacts will also be sampled as standard when sealed deposits are identified (e.g. barrels, crates, bilge).

7.6 Phase 8: Post-Excavation Site Stabilisation

7.6.1 Implementation of a plan for the stabilisation and preservation of the site, with specific attention to hull remains, based on environmental and archaeological results accumulated in Phases 1-6. Details are presented in 'Site Management & Maintenance Policy' (section 13 below).

⁹ *Dendrochronology. Guidelines on Producing and Interpreting Dendrochronological Dates* (English Heritage, 2004), 15.

7.6.2 After the completion of the Phases 3-6 fieldwork, proposals for long-term site stability and monitoring will be provided to the MHF in a written post-excavation project design. The strategy will draw upon analysis of environmental data and other results, pending the study of buried sacrificial material. Considerations for Phase 8 activities will include trench back-filling and *in situ* preservation options.

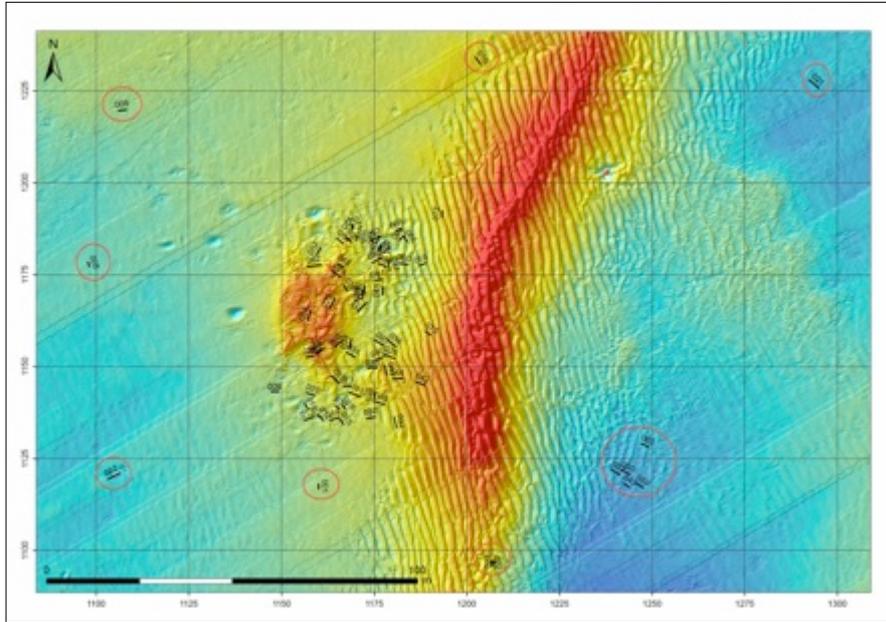


Fig. 15. Locations of Sub-Bottom Imaging Cannon Shaped Returns to be examined in Phase 3, Stage 1, alongside surface guns.

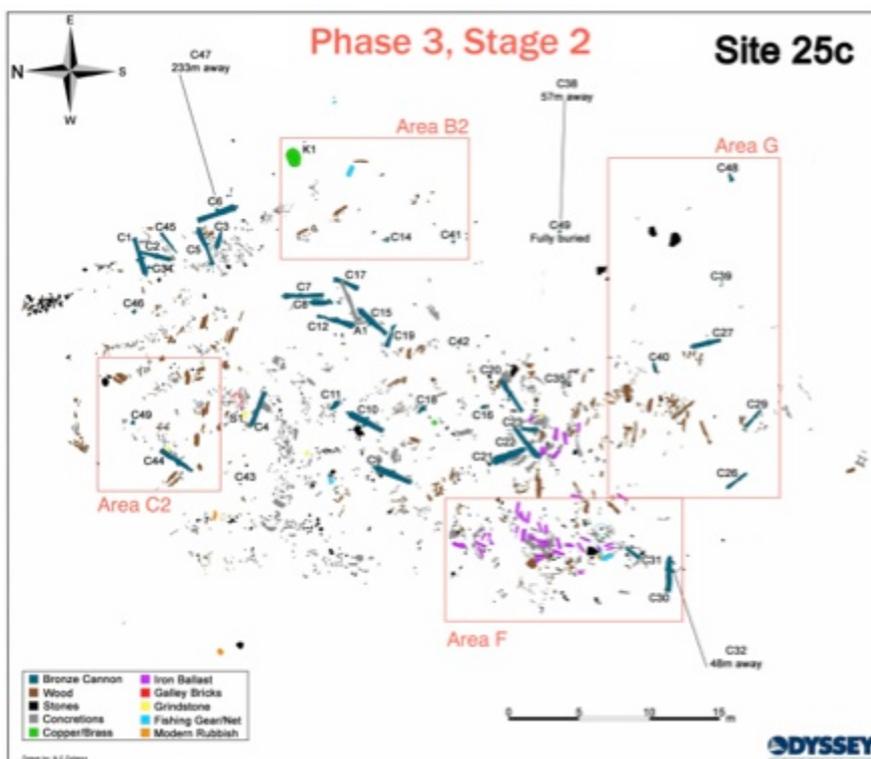


Fig. 16. Phase 3, Stage 2 cannon recording and recovery locations.

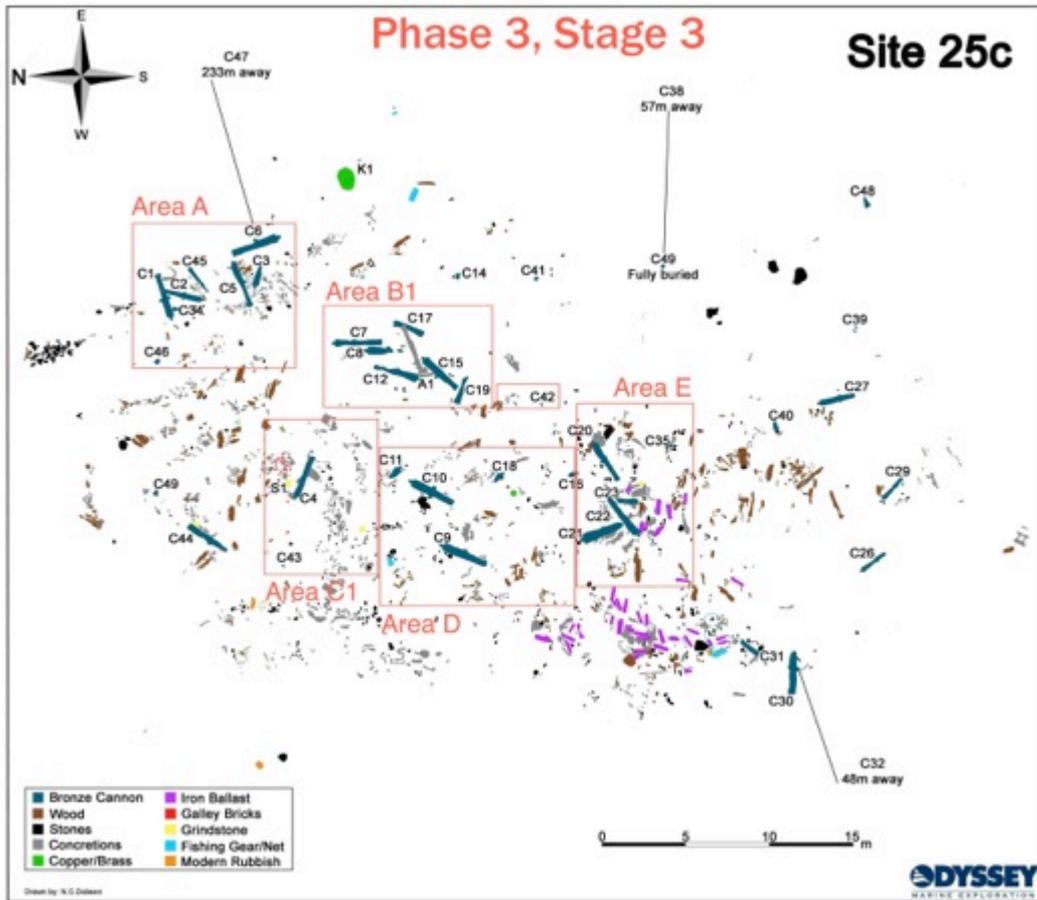


Fig. 17. Phase 3, Stage 3 cannon recording and recovery locations.

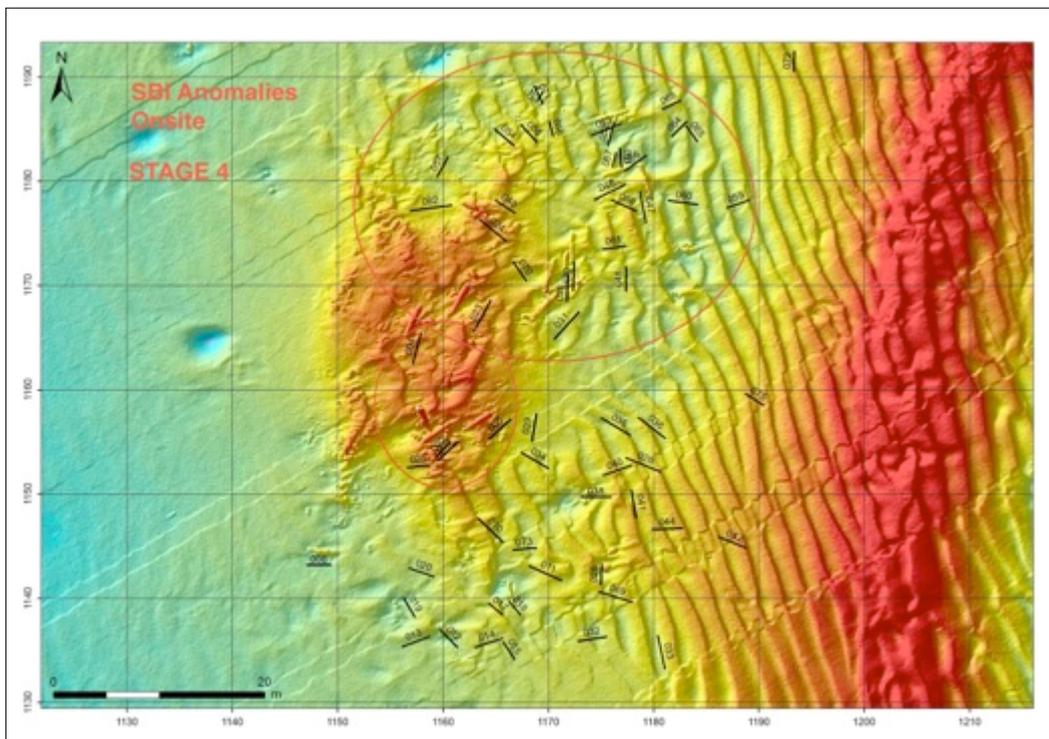


Fig. 18. Locations of Sub-Bottom Imaging Cannon Shaped Returns to be examined in Phase 3, Stage 4, alongside surface guns.

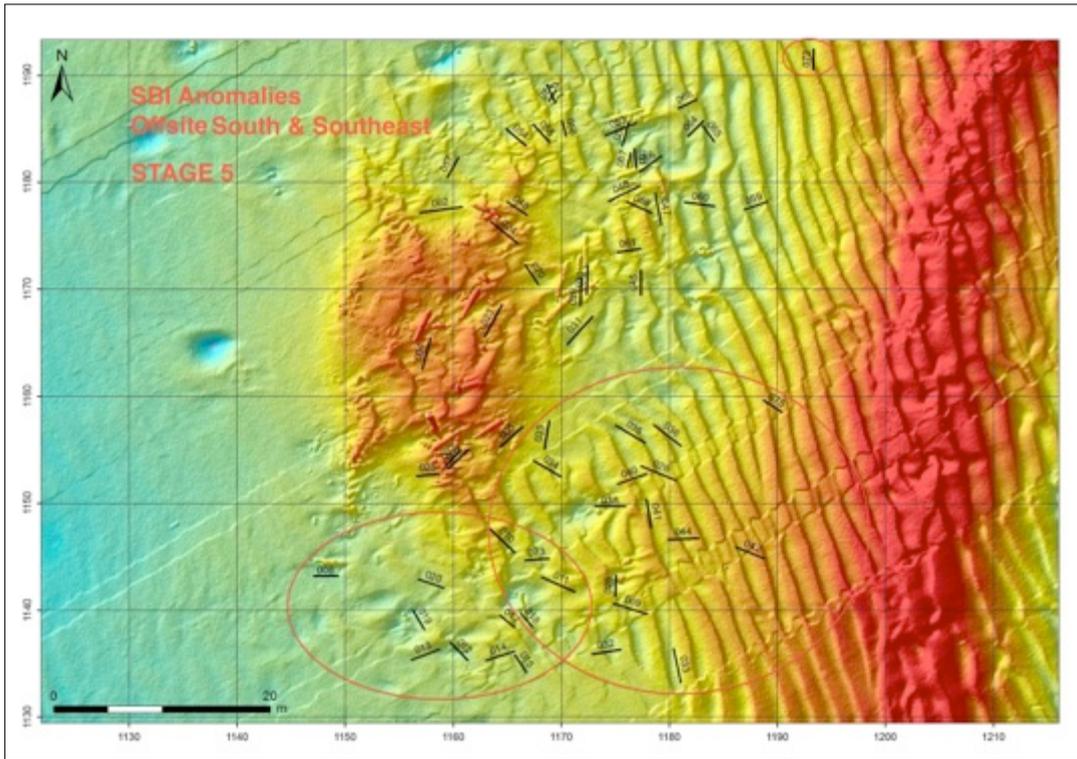


Fig. 19. Locations of Sub-Bottom Imaging Cannon Shaped Returns to be examined in Phase 3, Stage 5, alongside surface guns.

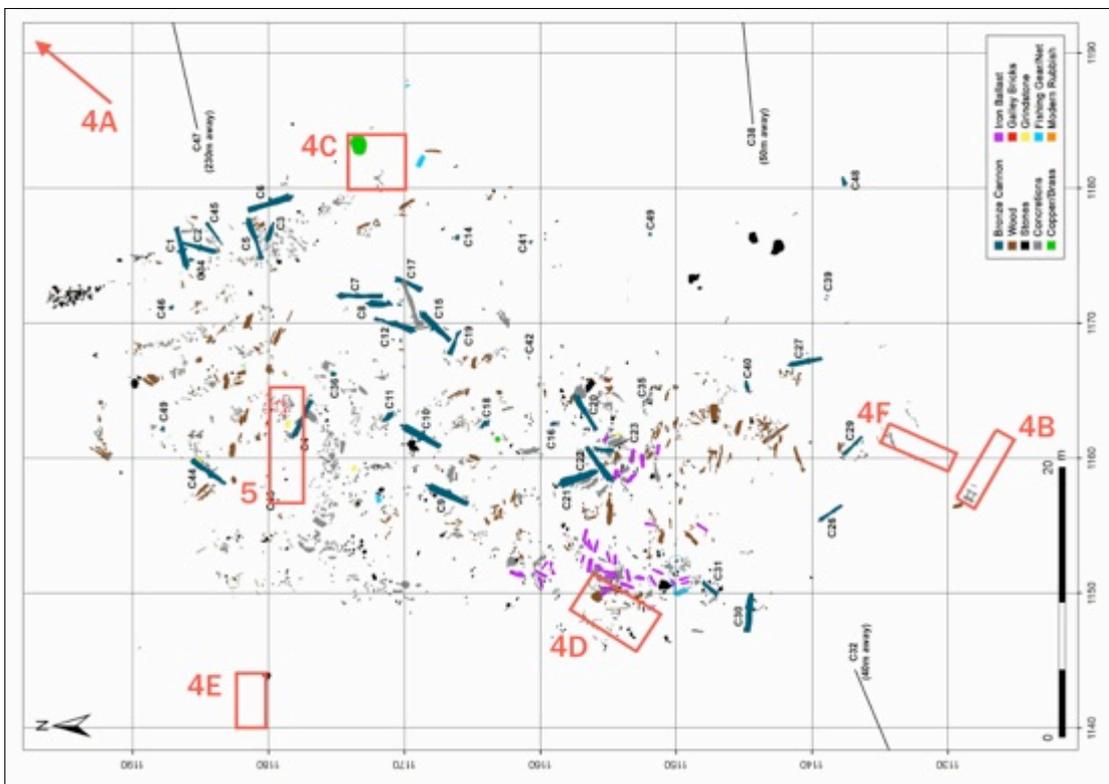


Fig. 20. Locations of Phases 4-5 fieldwork activities.

8. FUNDING & CONTINGENCY PLAN

8.1 Odyssey will provide a funding base sufficient to complete all Stages 1-9 and 11 of the Project Design, including Phase 1-8 fieldwork, artefact conservation, documentation and curation of recovered artefacts, site stabilisation, and report preparation and publication.

8.2 The project funding guaranteed by Odyssey includes a contingency plan whereby capital will be available to conclude any activities initiated or completed following any unexpected termination of the project. The contingency plan will cover:

8.3 The removal of all equipment from the site.

8.4 Full conservation of any artefacts and structural remains recovered.

8.5 Site stabilisation as appropriate through: the backfilling of trenches where necessary to pre-excavation levels; *in situ* preservation to protect any vulnerable structural remains exposed where feasible; a sediment drop, if determined to be practical and necessary.

8.6 Submission of the *Victory* 1744 Collection archive to the MHF in digital form, including: the fully documented artefact record; DataLog and Arch Commentary; photomosaic and micro-photomosaics; trench reports; all dive photographs and DVDs; and site interpretation and characterisation based on research levels addressed to date.

8.7 Completion of a Progress Report up to the point of project termination, explaining the reasons for any unexpected interruption, but otherwise containing comprehensive documentation of the site record.

9. TIMETABLE

9.1 The non-disturbance fieldwork component of the Project Design (Phases 1-2) was completed between February and August 2012. Analysis, research and report preparation was largely completed in 2013 (Morales González and Lozano Guerra-Librero, 2013; Prave *et al.*, 2013; Seiffert *et al.*, 2013). Completion of the marine biological survey is scheduled for the first half of 2014.

9.2 The following timetable has been formulated based on 24-hour operations. The time range stipulated is intended to accommodate the archaeological complexity encountered.

9.3 Stage 3, Phase 3A (Recovery Surface Cannon & Artefacts at Risk): preparative fieldwork (recording, preparation for removal) – 28-35 days.

9.4 Stage 3, Phase 3B (Recovery Surface Cannon & Artefacts at Risk): recovery and shipment to shore-based conservation facility – 10 days.

9.5 Stage 4, Phase 4 (Targeted Trial Excavation) – 21-28 days.

9.6 Stage 5, Phase 5 (Cooking Galley Targeted Excavation) – 5 days.

9.7 Stage 5, Phase 6 (Ongoing Targeted Excavation): to be agreed upon based on Progress Reports detailing the Phase 3-5 activities.

9.8 Stages 4-5, Phase 7 (Dendrochronology & Wood Sampling): to be conducted concurrent with Phases 3-5.

9.9 Stage 6, Phase 8 (Post-Excavation Site Stabilisation): to be scheduled in Phase 6 reporting.

9.10 Stage 7, post-excavation artefact documentation: to be completed within 12 months of fieldwork completion.

9.11 Stage 7, post-excavation site plans production: to be completed within 3 months of fieldwork completion.

9.12 Stage 8, Conservation: 19-43 months following the Phase 3 cannon recovery depending on methods employed (see section 12). Conservation durations following subsequent phases will be specified in Progress Reports.

9.13 Progress Reports will be submitted to the MHF between phases on a quarterly basis. The timetable for subsequent report and publications is presented in Section 18.

9.14 MHF and its contractors will permit the flexibility needed to complete the above tasks without fixing rigid temporal limits on the project. Phase 6 fieldwork will be subjected to discussion and updated timetabling in the Progress Reports. Phase 6 will be followed by ongoing post-excavation phases of artefact conservation, specialist studies, curation and educational outreach that will not be time delineated, apart from strict regard to processing data necessary for the production of reports.

9.15 The *Victory* Shipwreck Project is committed to publication of final results within ten years following the completion of fieldwork.

10. STAFFING

10.1.1 This section presents the composition of the *Victory* Shipwreck Project team and the qualifications, responsibilities and experience of team members.

10.1.2 The operational dimension of surveys, excavations and robotic systems is under the overall control of the Operation's Project Manager as director of technical functions, an approach which is essential to maintain safe and efficient operations within complex deep-sea working environments.

10.1.3 The Archaeology Project Manager is defined as the director of all archaeological activities on and off site.

10.1.4 The Operation's Project Manager operates in consultation with the Archaeology Project Manager to facilitate adherence to the Project Design.

10.1.5 Shift archaeologists work under the joint supervision of the Operation's and Archaeology Project Managers.

10.1.6 Underwater ROV surveying and operational activities are managed jointly by the Operation's and Archaeology Project Manager, who are responsible for managing three locations aboard the research ship:

- The ROV Control Room, where the pilots operate the ROV under tasked supervision.
- The archaeological work space (Offline Room), where the Operational and Archaeological Project Managers and shift archaeologists are based: to observe and direct the actions of the ROV through panoramic television displays; from where archaeologists have real-time communication with the ROV operators; the archaeologists process primary data in Arch Commentary, ArcGIS and other software packages.
- The Online Room where all events, survey data, photographs and monitoring data are recorded. Archaeologists oversee the technicians' work in these operations, including ROV tasks and data recording, by relaying strategy through the Operation's Project Manager.

10.1.7 The *Victory* Shipwreck Project will employ the multidisciplinary skills of personnel qualified in different fields of marine sciences, including geoscience, archaeology and conservation. The core team comprises the following personnel.

10.1.8 Maritime Heritage Foundation, Scientific Advisory Committee

- Dr. Margaret Rule, CBE – Director of the *Mary Rose* excavation project and author of *The Mary Rose. The Excavation and Raising of Henry VIII's Flagship* (Foreword by HRH The Prince of Wales).
- Ivor Noël Hume, OBE – Director for 30 years of the Colonial Williamsburg Foundation's department of archaeology and conservation laboratory. Author of *Artifacts of Colonial America; If These Pots Could Talk: Collecting 2,000 years of British Household Pottery; Martin's Hundred: The Discovery of a Lost Colonial Virginia Settlement*.

- Commander John Bingeman – Former licensee UK Protected Wrecks HMS *Invincible* (1758), HMS *Assurance* (1753), HMS *Pomone* (1811). Author of *The First HMS Invincible (1747-58)*. *Her Excavations* (1980-1991).

10.1.9 Odyssey Marine Exploration, Operational Project Team

- Project Managers (Archaeology):
 - Dr. Sean Kingsley, MIFA, FRSA, Wreck Watch Int., London;
 - Neil Cunningham Dobson, AIFA, Odyssey Marine Exploration;
 - Dr. Claudio Lozano, Coastal Geology and Water Resources Investigation Group, University of Huelva.
- Project Managers (Operation's): Andrew Craig, Ewan Bason, Aaron Rogerson, Odyssey Marine Exploration.
- Director of Conservation: Frederick Van de Walle, Odyssey Marine Exploration.
- Data Managers: Dr. Gerhard Seiffert, Bastian Genna, Odyssey Marine Exploration.
- Archive Curator: Ellen Gerth, Odyssey Marine Exploration.

11. POST-FIELDWORK ANALYSIS & OTHER ACTIVITIES

11.1 An extensive programme of scientific analyses will be pursued on site 25C by the archaeological team and specialist consultants following the cessation of fieldwork with the objective of maximising understanding of the shipwreck's values, including:

11.2 Drawing and recording all cannon and representative samples of recovered artefacts (Fig. 21).

11.3 Full cataloguing and documentation of all artefacts for typological studies and quantification (from cannon to pottery, glass sherds and animal bones).

11.4 Specialist study of the cannon, pottery and all artefact assemblages.

11.5 Environmental and marine biological analyses.

11.6 Species analysis of representative samples of wooden hull timbers.

11.7 Identification and interpretation of exposed hull sections.

11.8 Comprehensive scientific report production and publication.

11.9 For these purposes the services of the following specialist consultants have been retained.

- *Environmental Analysis:* [REDACTED].
- *Marine Biology:* [REDACTED].
- *Bronze Cannon:* Charles Trollope, UK; Nico Brinck, Holland.
- *Pottery:* Ivor Noël Hume, USA; Dr. Sean Kingsley, Wreck Watch Int., UK; Ellen Gerth, Curator, Odyssey Marine Exploration, USA.
- *Glass:* Ivor Noël Hume, USA; Dr. Sean Kingsley, Wreck Watch Int.
- *Small Finds:* Dr. Sean Kingsley, Wreck Watch Int., UK; Neil Cunningham Dobson, Odyssey Marine Exploration, USA.
- *Tobacco Pipes:* [REDACTED].
- *Leather Shoes:* [REDACTED].
- *Wooden Hull & Structural Remains:* [REDACTED].
- *Hull Species Analysis, Dendrochronology and Dendroprovenancing:* [REDACTED].
- *Human Bones:* Dr. Ceridwen Boston, Research Laboratory for Archaeology and the History of Art, Oxford, UK.

- *Animal Bones:* [REDACTED].

11.10 Additional consultant specialists will be approached and retained organically as required as the project progresses.

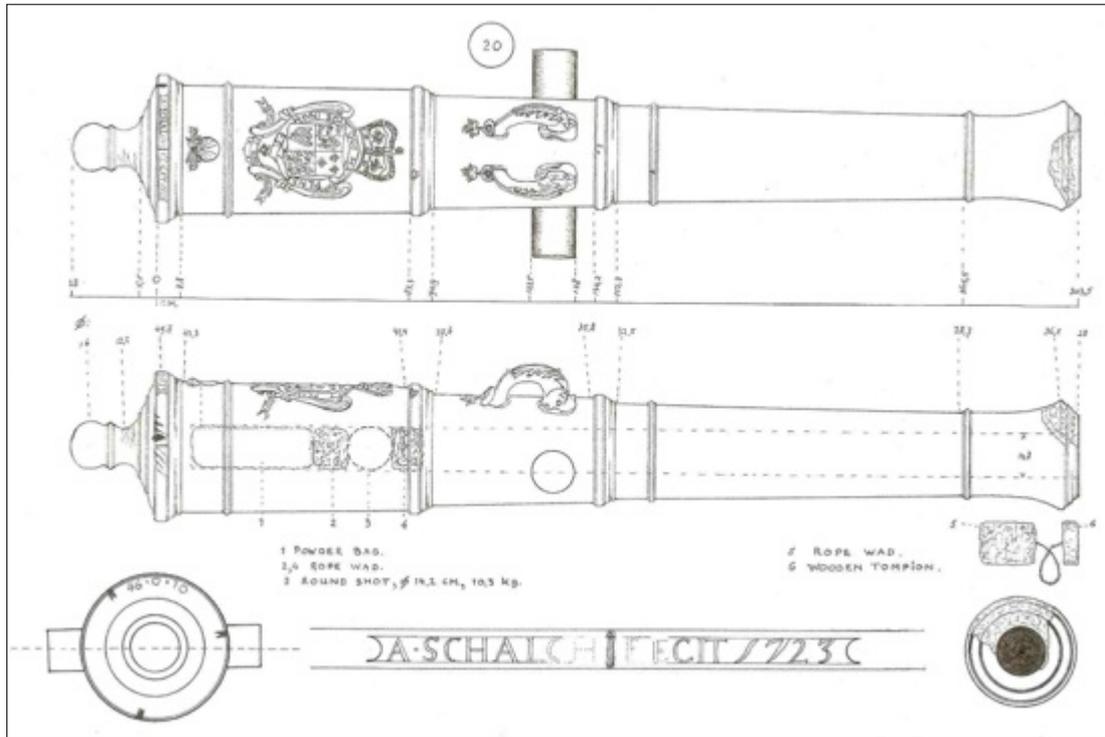


Fig. 21. Bronze 24-pounder cannon C13 from the *Victory*, cast by Andrew Schalch in 1723. Looted from site 25C in 2011 and recorded for the project by Nico Brinck.

12. CONSERVATION PROGRAMME

12.1 Introduction

12.1.1 The conservation programme for site 25C provides for the treatment of the archaeological remains during the activities on the research ship, during transit and long-term. Conservation will be carried out in accordance with recognised professional and ethical standards, conforming to the principles provided by Rule 24 of the Annex of the UNESCO Convention, and in accordance with guidelines and practices of the Institute of Conservation (ICON).

12.1.2 During and after excavation the conservation staff will only use products, materials and procedures that, according to current levels of research and knowledge, will not harm the cultural heritage, the environment or personnel. All conservation treatment will be undertaken with the intention of preserving the maximum degree of evidential value and with the minimum impact on the authenticity of artefacts. The action itself, and the materials used, should not interfere – if at all possible – with any future examination, treatment or analysis. They should also be compatible with the materials of the cultural heritage and be as easily and completely reversible as possible.

12.1.3 The conservation treatment of cultural heritage will be documented in written and graphic records of the diagnostic examination, any conservation/restoration intervention and other relevant information. All conservation examinations and treatments will be recorded and records kept long-term.

12.1.4 'First Aid' conservation will be provided for the artefacts immediately upon arrival at the surface by the shipboard archaeologists and conservation assistants under the guidance of the Director of Conservation. This will consist of maintaining an artefact's stability by storage in suitable solutions at a stable, cool temperature away from direct sunlight. Plastic containers of multiple sizes and shapes (with sealable lids) will accommodate each type of artefact retrieved. A unique identification number will be written on each container, and artefact and bucket numbers will be logged in the master database. Objects of dissimilar composition will be stored separately.

12.1.5 Post-fieldwork conservation will be conducted under the supervision of the Director of Conservation in accordance with *Guidance for Archaeological Conservation Practice, Archaeology Section, UKIC*.

12.1.6 A land-based conservation facility has been identified in the UK to handle the conservation process for artefacts and ecofacts. This facility will be equipped to receive all artefacts from first aid through certain levels of conservation up to full conservation (depending on the artefact and the complexity of its conservation).

12.1.7 The conservation laboratory will be suitable for treating all artefacts and cannon recovered during the Phase 3-7 activities.

12.1.8 Storage facility capabilities will include desalinisation, water washing, electrolysis, stabilisation and monitoring of temporary storage environments. A conservation team, working under the Director of Conservation, will be assembled and established in the shore-based facility to provide the appropriate technical response to the conservation needs.

12.1.9 Certain artefacts may require specialist treatment beyond what it is reasonable to expect the shore-based facility to provide. In these cases, outsourced contract services will be used.

12.1.10 A *Conservation Plan* detailing the shore-based conservation facilities will be produced for the MHF as a separate document.

12.2 Cannon Conservation

12.2.1 Three options are available for conservation of the *Victory* cannon collection recovered during the Phase 3 activities. Electrolysis is recommended as the first option because this method is fastest and usually yields optimum results.

12.2.2 Depending on the number of guns recovered and their relative level of preservation, all three methods will be trialled as a comparative study:

- Option 1: Electrolysis resulting in change in appearance (dark brown end finish).
 - Timeframe: 19 months per cannon to complete.
 - Cost x 25 guns: £ [REDACTED].
 - Cost x 40 guns: £ [REDACTED].
 - Cost x 50 cannon: £ [REDACTED].
- Option 2: Desalination with least change in appearance (dark green uneven end finish).
 - Timeframe: up to 43 months per cannon to complete.
 - Costs: same as Option 1 minus £1,000 per cannon.
- Option 3: Chemical stripping with loss of detail and light to dark brown end result.
 - Up to 31 months per cannon to complete.
 - Costs: same as Option 1 minus £1,000 per cannon.

12.2.3 Results and the timeframe of completion will depend on the amount of corrosion and active salts present in each gun.

12.2.4 Facility costs and electricity are not included in the above costings.

12.3 Option 1

12.3.1 Stage 1: For all cannon mechanical concretion removal and cleaning of the bore before any treatment – 5 days per cannon with 2 people.

12.3.2 Stage 2: Electrolysis, minimum of 12 months per cannon + 6 months of rinsing in deionized water.

12.3.3 Stage 3: 10 days for drying and application of protection layer (benzotriazole + microcrystalline wax).

12.4 Option 2

12.4.1 Stage 1: For all cannon mechanical concretion removal and cleaning of the bore before any treatment – 5 days per cannon with 2 people.

12.4.2 Stage 2: desalination in sodium sesquicarbonate up to 36 months + 6 months of rinsing in deionized water.

12.4.3 Stage 3: 10 days for drying and application of protection layer (benzotriazole + microcrystalline wax).

12.5 Option 3

12.5.1 Stage 1: For all cannon mechanical concretion removal and cleaning of the bore before any treatment – 5 days per cannon with 2 people.

12.5.2 Stage 2: Chemical stripping in citric acid + thiourea, 7-10 days.

12.5.3 Stage 3: Desalination, minimum of 24 months per cannon + 6 months of rinsing in deionized water.

12.5.4 Stage 4: 10 days for drying and application of protection layer (benzotriazole + microcrystalline wax).

13. SITE MANAGEMENT & MAINTENANCE POLICY

13.1 Introduction

13.1.1 This section proposes a site management and maintenance policy for the duration of the project, including research, provision for public education and information, sustainable use and a vision for the future.

13.2 Site Stabilisation

13.2.1 The phased fieldwork involves intrusive activities during which a policy of least disturbance will be pursued. This applies especially to hull remains exposed, which will be subjected to Level 1 and Level 2 recording and analysis facilitating Second and Third Stage reconstruction as defined in *Standard and Guidance for Nautical Archaeological Recording and Reconstruction* (IfA, 2008: 2, 7).

13.2.2 Due to the wreck's depth, interference from divers, salvors and fishing vessels is unlikely to hinder the project while the *Odyssey Explorer* research ship is on-site. When off station *Odyssey* will monitor the site coordinates remotely on a continuous basis using AIS.

13.2.3 In the absence of evidence about the sub-seabed character and preservation of archaeological remains, it is premature to propose a definitive site stabilisation policy. Advice will be submitted to the MHF in each Progress Report.

13.2.4 As a first priority any exposed timbers will be reburied to sediment levels present prior to the commencement of intrusive operations. Monitoring will subsequently verify whether the recovery of surface artefacts causes erosion, scouring or enhances site stabilisation.

13.2.5 Following re-burial a phase of monitoring (either acoustic or visual) will assess site 25C's stability. Its timeframe will be stipulated in a Post-Excavation Project Design to be submitted to the MHF after the completion of Phases 3-6. Site visits will generate reports to the MHF containing recommendations for future strategy. Monitoring may demonstrate that with the removal of surface artefacts, creating an uninterrupted, smoothed seabed surface, scour around former seabed obstructions will be reduced, naturally stimulating deeper sediment accumulation than currently prevails. The protrusion of cultural remains on shipwrecks above the seabed is an identified cause of scouring and destabilisation (Parham, 2010: 4.2.4).

13.2.6 Dependent on the results of monitoring, a programme of *in situ* preservation may be proposed based on recognised methods (cf. Palma, 2005; Manders, 2011; see section 4.4). The most effective means of slowing down the deterioration of exposed and buried timbers is considered to be the use of Terram 4000 geotextile, which in trials outperformed other methods in terms of sediment depth achieved. The use of geotextile was also the only system that has not shown acute maintenance issues (Camidge, 2009: 165, 170-1). In such an eventuality geotextile fronds may be weighed down with polypropylene sandbags.

13.2.7 It must be emphasised that no comparable *in situ* preservation initiative has been attempted on a deep-sea site outside UK territorial waters or worldwide using ROVs. Flexibility of method will be required.

13.2.8 To the above may be added consideration of subsea stabilisation techniques designed for ROV use in the pipeline industry, notably Submat Bitumen Mattresses.¹⁰

13.3 Research

13.3.1 The *Victory* Shipwreck Project is dedicated to preservation by record, research and publication. The detailed research programme and its delivery are presented in Sections 5.3 and 18.

13.4 Public Education & Information

13.4.1 The *Victory* forms a unique record of past human activity, which reflects the aspirations, ingenuity and investment of resources of previous generations. In addition, it is an economic asset and should provide a resource for education and enjoyment.

13.4.2 An incompatibility exists between the objective of sharing the resource, safeguarding the site and its inaccessibility (beyond the application of sophisticated remote-access technology). Visitor management beyond specialised diving teams is neither practical nor safe.

13.4.3 Left unexamined the *Victory* will be subjected to ever-increasing erosion and loss of irreplaceable data and values. Due to the inaccessible nature of the *Victory* site, the MHF is committed to a management philosophy of sharing the site for the education and enjoyment of the public and all stakeholders through sustained public outreach.

13.4.4 One level of public education is the project's online Virtual Dive Trail (www.victory1744.org), a web portal which will be developed during and after the project with updated content of news, video coverage and publications.

13.4.5 Plans have been devised for the development of a temporary travelling exhibition centred on the history and archaeology of *Victory*.

13.4.6 Potential exhibition and storage capabilities have been discussed [REDACTED]

13.4.7 A permanent storage location for the project archive and artefacts, as well as opportunities for cooperation with museums for managing the archive, is being identified and will be secured following initiation of the project and during the first phase of artefact conservation.

13.4.8 Artefacts from the *Victory* 1744 Collection will remain accessible to scholars and for display by museums and other heritage organisations.

¹⁰ <http://www.slp-eng.com/Submat/Downloads/Submat%20Brochure.pdf>: pp. 5-6.

14. DOCUMENTATION PROGRAMME

14.1 The site 25C documentation programme will consist of the production of full records (written, graphic, digital and photographic) for all archaeological activities associated with the core dive DataLogs, Arch Commentary and Artifact Inventory. All records will be stored in a secure and appropriate environment onboard the *Odyssey Explorer*, be regularly backed up, and duplicated copies transferred to shore for storage in separate locations every time the research ship returns to dock (including the MHF archive in the UK and the Odyssey archives).

14.2 The documentary archive will include:

14.3 Photography:

- Survey: video record and still digital photography of all non-disturbance surface archaeological artefacts and features related to Phase 1.
- Marine Biological Assessment: video record and still digital photography of features related to the Phase 2 non-disturbance survey and as relevant during excavation.
- Survey: site photomosaics produced for purposes of activities planning and site management during the non-disturbance Phase 1B operations.
- Recoveries: video record and still digital photography related to the recovery of Phase 3 surface cannon and artefacts at risk.
- Excavation: video record and still digital photography of Areas and Trenches before, during and upon completion of Phases 4-6 intrusive excavation.
- Excavation: vertical micro-photomosaics of Phases 4-6 Areas and Trenches before and upon completion of intrusive excavation.
- Registration: detailed photography of an artefact or structural remains after recovery and prior to conservation.
- Post-conservation: comprehensive photography of artefacts for master archive, scientific publications and other use.

14.4 Digital Records:

- The master site plan formulated from the 2012 site photomosaic.
- Side-scan sonograms, multibeam profiles, FADE, TSS and SBI data generated in the pre-disturbance Phase 1A activities.
- Plans of excavated trenches produced in the post-excavation phase.
- Illustrations of artefacts and structural remains generated in the post-excavation reporting phase.
- DataLog entries converted to Excel.
- Arch Commentary entries converted to Excel.

- Individual Trench Reports.
- Completed Artefact Inventory forms.
- All Progress Reports and subsequent reports.

14.5 The documentation programme will result in the production of three layers of reporting (Section 18 below): Progress Reports describing in preliminary form activities for each Phase; Preliminary Scientific Reports; and Final Scientific Reports.

15. SAFETY POLICY

15.1 The safety, health and welfare of all individuals and parties involved is paramount to archaeological investigations. This is particularly important with respect to the nature of deep-sea investigations, which involve the use of research vessels, ROVs, various contractors and experts who provide services and equipment relevant to offshore operations.

15.2 Such marine-based projects involve employees, contractors, experts and equipment, systems and vessels from various nationalities. The research vessel *Odyssey Explorer* is owned by Odyssey, an American company, and the ship is a Bahamian flagged vessel with its captain, officers and crew assembled from different countries. The ship follows stringent safety, health and welfare laws (COSHH and RIDDOR/OSHA submitted to the MHF).

15.3 Contractors and experts from various nationalities come under health and safety legislation that pertains to their type of business and services with regard to their country's laws and regulations, while at the same time complying with international maritime laws and regulations.

15.4 Odyssey will ensure that all individual contractors, experts and companies involved in the site 25C project have – and are aware of – a health and safety policy and follow and agree to the health, safety and welfare policies required for the project.

15.5 Odyssey has adopted an extensive health and safety policy, as well as an archaeological safety policy, a COSHH policy and a conservation health and safety policy. Each new person onboard the *Odyssey Explorer* is subjected to safety orientation, is taken around the vessel by an officer and provided with all relevant safety information.

15.6 Odyssey recognises its common law and statutory duties and obligations as regards the health and safety of its employees and aims:

- To maintain an environment for all employees, contractors, visitors and users of its services that is:
 - As healthy and safe as is reasonably practicable;
 - To promote and apply safe practices and work methods as is reasonably practicable; and
 - To ensure that appropriate training, instruction and information are provided.

15.7 Standards will be maintained and monitored via policies and procedures overseen by senior managers in Odyssey, who will be responsible for the implementation of the Health and Safety Policy and all procedures. Odyssey undertakes to monitor the Health and Safety Policy at regular intervals and to revise its contents as and when necessary.

16. COLLABORATION WITH MUSEUMS & OTHER INSTITUTIONS

16.1 Recognising the complex nature of underwater cultural heritage and the importance of research, information and education to the understanding, protection and preservation of underwater cultural heritage, the MHF is committed to an ambitious programme of public outreach.

16.2 The *Victory* Shipwreck Project utilises the skills of an international, multidisciplinary team spanning fieldwork and publication, including personnel from the University of St. Andrews, Scotland, the University of Huelva, Spain, and Brixham Heritage Museum. The international team of project specialists is listed in Section 11.

16.3 Depending on the character and quantity of cultural heritage encountered during fieldwork, the MHF and Odyssey anticipate at a minimum the following public outreach.

16.4 Development of the *Victory* Virtual Dive Trail with updated content.

16.5 Close collaboration with the National Museum of the Royal Navy, Portsmouth, to offer as a first option the *Victory* 1744 Collection and to provide historical and interpretative information and imagery.

16.6



16.7 Research into artefact assemblages with various organisations and specialists.

16.8 Development of an exhibition focusing on the history, excavation and interpretation of the *Victory*, either permanent in collaboration with one of the above institutions or on a travelling basis (depending on the volume and quantity of artefacts recovered and interest levels).

16.9 The MHF and Odyssey will collaborate to produce an educational module on *Victory* 1744 for educational use in the UK and abroad.

16.10 Plans for collaboration with museums and other organisations are ongoing between the MHF and Odyssey.

17. ARCHIVE DEPOSITION

17.1 The project archive (*Victory* 1744 Collection) in the form of supporting digital, written and graphic documentation, will be deposited in full with the MHF no later than two years following the completion of fieldwork. A complete duplicate set of the archive will be stored in the archaeology, research and conservation laboratory of Odyssey in Tampa, Florida.

17.2 It is the MHF's declared intention that its recovered archaeological material and associated archive will remain together as a single assemblage wherever possible. Plans for the deposition of surface artefacts at risk recovered during the Phase 3 activities is under discussion with several museums and will be developed during the guns' conservation. The MHF is committed to the public exhibition of as many artefacts as reasonably possible.

17.3 Underwater cultural heritage not placed on public display and retained within a museum collection will be stored in a secure storage facility.

17.4 Detailed planning is necessary for responsible curation of the archaeological data recovered. This will ensure the maintenance of the long-term integrity of the archive, which will represent the principal primary surviving evidence of material recovered from the site and intrusive activities. The project curation administration and standards will follow international best practice protocols.

17.5 The curation process, directed by the Archive Curator, will incorporate and integrate the archaeological collection for purposes of long-term artefact preservation, archive management (digital and hard copy), as well as to facilitate future research activities and education. The archives will contain a combination of both physical and digital data. The principal components of the archives are expected to include:

- Content menu and table.
- Site location plans.
- Survey data (geophysical side-scan sonograms, multibeam/TSS/FADE/SBI imagery).
- Project Designs.
- Context records.
- Context register.
- Illustrated site plans and sections.
- Site notes and diaries.
- Data logs.
- Fieldwork photographs.
- Images and image register.
- Catalogue of finds recovered (artefacts and other objects).
- Artefact registration records.
- Environmental materials, records and analyses (ecofacts, soil and other samples).
- Select artefacts.
- Publications.
- Post-excavation records, conservation research results and interpretation (Preliminary Scientific Reports, Final Scientific Reports, specialist reports).
- Post-excavation assessment archives (post-excavation project design reports, specialised assessment reports, interpretative drawings, finds catalogues).

17.6 The MHF takes into account professional archival standards and practices for preserving existing archaeological records and preventing the loss of records. The documentation plan will utilise appropriate long-lived digital media for the creation of original records in the field, laboratory and repository. This also has the benefit of minimising the use of physical space within the repository and eases information dissemination.

17.7 Upon completion of the project, the *Victory* 1744 Collection will be accessible to researchers and scientists.

18. REPORT PREPARATION & PROGRAMME FOR PUBLICATION

18.1 The *Victory* Shipwreck Project is committed to a holistic programme of three levels of report preparation and publication, ranging from the popular to scientific, to appeal to the widest possible spectre of society.

18.2 Progress Reports. The cornerstone of fieldwork quality control, these will be submitted to the MHF on a quarterly basis or upon completion of each phase. The Progress Reports will include:

- Details of methods and techniques used, with relevant guidance/standards;
- An account of the objectives;
- Results achieved;
- Artefacts and non-artefactual evidence and remains recovered with proposals for their conservation;
- Basic graphic and photographic documentation;
- Recommendations for future activities, including stabilisation of any parts of the site disturbed;
- Recommendations/plans for the future management and public display of any artefactual and non-artefactual evidence recovered;
- Plans for the publication and dissemination of any work undertaken;
- Specific recommendations and plans for the appropriate reburial of any human remains accidentally recovered.

18.3 Preliminary Scientific Reports. Based on the Progress Reports, and supplemented by updated documentation (site plans, artefact records) and conservation results, a scientific overview of activities will be presented to the MHF within 24 months of the completion of Phases 1-5 for proposed publication on MHF and Odyssey website platforms. A second Preliminary Scientific Report suitable for publication will be submitted to the MHF within 12 months of the completion of Phase 5-6 (as relevant to completed fieldwork). A final Preliminary Scientific Report will be submitted to the MHF within 12 months of the completion of Phase 8 (Post-Excavation Site Stabilisation). The Preliminary Scientific Reports will be fully referenced and include interpretative information.

18.4 Final Scientific Reports. Upon completion of the above sets of papers, these will be collated and published in hard copy form, supplemented by stand-alone specialist reports on the environment, marine biology, various artefacts classes and historical interpretation. The final reports will be published by Oxbow Books, Oxford, within five years of the completion of the site 25C project, and no longer than ten years in total to complete the series, and will serve as the final archaeological documentation record of the project.

18.5 Semi-Popular & Popular Media. The Preliminary Scientific Reports will be used as the basis to produce semi-popular articles geared to public outreach in trade magazines and popular articles for mainstream newspapers and magazines.

18.6 Synthesis of works will be offered to leading international journals and presentations offered to conferences.

BIBLIOGRAPHY

Bingeman, J., *The First HMS Invincible (1747-58). Her Excavations (1980-1991)* (Oxford, 2010).

Camidge, K., *HMS Colossus. Progress Report 2003* (2003).

Camidge, K., *HMS Colossus. CISMAS Debris Field Survey 2005* (2005).

Camidge, K., 'HMS Colossus, an Experimental Site Stabilization', *Conservation and Management of Archaeological Sites* 11.2 (2009), 161-88.

Code of Ethics for Museums. Ethical Principles for All Who Work for or Govern Museums in the UK (Museums Association, 2008).

Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage, 2008).

Cunningham Dobson, N. and Kingsley, S., 'HMS Victory, a First-Rate Royal Navy Warship Lost in the English Channel, 1744. Preliminary Survey & Identification'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey. Deep-Sea Shipwrecks in the English Channel, Straits of Gibraltar & Atlantic Ocean* (Oxbow Books, Oxford, 2010), 235-81.

Cunningham Dobson, N. and Tolson, H., 'A Note on Human Remains from the Shipwreck of HMS Victory, 1744'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey. Deep-Sea Shipwrecks in the English Channel, Straits of Gibraltar & Atlantic Ocean* (Oxbow Books, Oxford, 2010), 281-88.

Dellino-Musgrave, V. and Ransley, J., 'Early Modern and Industrial, c. 1650 to 1850'. In J. Ransley, F. Sturt, J. Dix, J. Adams and L. Blue, *People and the Sea: A Maritime Archaeological Research Agenda for England* (CBA, York, 2013), 164-85.

Dendrochronology. Guidelines on Producing and Interpreting Dendrochronological Dates (English Heritage, 2004).

Dromgoole, S., 'Why the UK Should Reconsider the UNESCO Convention 2001'. In R.A. Yorke (ed.), *Protection of Underwater Cultural Heritage in International Waters Adjacent to the UK. Proceedings of the JNAPC 21st Anniversary Seminar, Burlington House November 2010* (JNAPC, 2011), 22-29.

Elkin, D., Argueso, A., Grosso, M., Murray, C., Vainstub, D., Bastida, R. and Dellino-Musgrave, V., 'Archaeological Research on HMS Swift: a British Sloop-of War Lost off Patagonia, Southern Argentina, in 1770', *International Journal of Nautical Archaeology* 36.1 (2007), 32-58.

Godfrey, I.M., Gregory, D., Nystrom, I. and Richards, V., 'In situ Preservation of Archaeological Materials and Sites Underwater'. In *Tutela, Conservazione e Valorizzazione del Patrimonio Culturale Subacqueo* (Napoli, 2004), 343-51.

González, J.A.M. and Lozano Guerra-Librero, C., 'Dynamics of Sediment Bedforms in the Western English Channel: the Wreck of the Victory (Site 25C) in Context', *OME Papers* 34 (Tampa, Florida, 2013).

Guidance for Best Practice for Treatment of Human Remains Excavated from Christian Burial Grounds in England (English Heritage & the Church of England, 2005).

HMS Victory, 1744 (Site 25C) – Project Design (February 2012)

HMS Victory, 1744 (Site 25C) – Project Design: Revision A (June 2012).

HMS Victory (1744). Key Management Principles (April 2013).

Kingsley, S., 'Deep-Sea Fishing Impacts on the Shipwrecks of the English Channel & Western Approaches'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey. Deep-Sea Shipwrecks in the English Channel, the Straits of Gibraltar and the Atlantic Ocean* (Oxford, 2010), 191-234.

Kingsley, S., Cunningham Dobson, N. and Van de Walle, F., 'Balchin's Victory (Site 25C): Shipwreck Monitoring & Cannon Impacts, 2008-2012', *OME Papers 24* (Tampa, Florida, 2012), 1-32.

L'Hour, M. and Veyrat, E., 'Les épaves de la bataille de la Hogue (Manche)', *Archaeonautica 14* (1998), 243-51.

Maarleveld, Th., Guérin, U. and Egger, B. (eds.), *Underwater Cultural Heritage and the Rules of the UNESCO 2001 Convention: a Manual* (UNESCO, Paris, 2013).

Maisonneuve, De., B., 'Excavations of the Maidstone, a British Man-of-war Lost off Noirmoutier in 1747', *International Journal of Nautical Archaeology 21.1* (1992), 15-26.

Manders, M.R. (ed.), *Guidelines for Protection of Submerged Wooden Cultural Heritage* (WreckProtect, 2011).

Manders, M.R. and Lüth, F., 'Safeguarding'. In *Monitoring, Safeguarding and Visualizing North European Shipwreck Sites: Common European Cultural Heritage – Challenges for Cultural Resource Management* (MoSS Project Final Report, National Board of Antiquities, Finland, 2004), 63-73.

Owen, N.C., 'HMS Hazardous Wrecked 1706. Pre-Disturbance Survey Report 1987', *International Journal of Nautical Archaeology 17.4* (1988), 285-93.

Palma, P., 'Monitoring of Shipwreck Sites', *International Journal of Nautical Archaeology 34.2* (2005), 323-31.

Parham, D., *Swash Channel Designated Wreck Site Project Design - Mitigation of a High Risk Protected Wreck PDSCW (E) 1.5* (Bournemouth University, May 2010).

Parham, D. and Palma, P., *Swash Channel Wreck; 2008 Season Report* (Maritime Archaeology Research Group, Bournemouth University, 2008).

Prave, A.R., Herd, D.A., Calder, A.C. and Allison, S.G., 'The Wreck of the First Rate Warship the Victory, Western English Channel: Site 25C Sediment Analysis', *OME Papers 33* (Tampa, Florida, 2013).

Protected Wreck Sites at Risk. A Risk Management Handbook (English Heritage, 2008).

Richards, V., Godfrey, I., Blanchette, R., Held, B., Gregory, D. and Reed, E., 'In Situ Monitoring and Stabilization of the *James Matthews* Shipwreck Site'. In K. Straetkvern and D.J. Huisman (eds.), *Proceedings of the 10th ICOM Group on Wet Organic Archaeological Materials Conference, Amsterdam, 2007* (Rijksdienst voor Archeologie, Cultuurlandschap en Monumenten, 2009), 113-60.

Seiffert, G., Cunningham Dobson, N., Van de Walle, F. and Kingsley, S., 'HMS *Victory* (Site 25C). Preliminary Results of the Non-Disturbance Shipwreck Survey, 2012', *OME Papers* 31 (Tampa, Florida, 2013).

Skowronek, R.K. and Fischer, G.R., *HMS Fowey Lost and Found* (University Press of Florida, 2009).

Stanbury, M., 'HMS *Sirius* 'reconstructed... Pygmy Battle Ship' or 'Appropriate' 6th Rate Vessel?'. In M. Bound (ed.), *Excavating Ships of War* (Oswestry, 1998), 217-29.

Standard and Guidance for Archaeological Excavation (Institute for Archaeologists, 2008).

Standard and Guidance for Nautical Archaeological Recording and Reconstruction (Institute for Archaeologists, 2008).

Steffy, J.R., *Wooden Ship Building and the Interpretation of Shipwrecks* (Texas A&M University Press, 1994).

Tomalin, D.J., Simpson, P. and Bingeman, J.M., 'Excavation Versus Sustainability In Situ: a Conclusion on 25 Years of Archaeological Investigations at Goose Rock, a Designated Wreck-Site at the Needles, Isle of Wight, England', *International Journal of Nautical Archaeology* 29.1 (2000), 3-42.

Trollope, C., 'Brass Guns & Balchin's *Victory* (1744): the Background to their Casting'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey 2. Underwater Heritage Management & Deep-Sea Shipwrecks in the English Channel & Atlantic Ocean* (Oxford, 2011), 51-60.

Van de Walle, F., 'Balchin's *Victory*: Bronze Cannon Conservation Report'. In G. Stemm and S. Kingsley (eds.), *Oceans Odyssey 2. Underwater Heritage Management & Deep-Sea Shipwrecks in the English Channel & Atlantic Ocean* (Oxford, 2011), 61-69.

Wessex Archaeology, 2009A. *OME Site 25C, Western English Channel. Archaeological Desk-based Assessment.*

Wessex Archaeology, 2009B. *OME Site 25C, Western English Channel. Geophysical Survey and Site Environment Report.*

Winfield, R., *British Warships in the Age of Sail 1714-1792* (Barnsley, 2007).