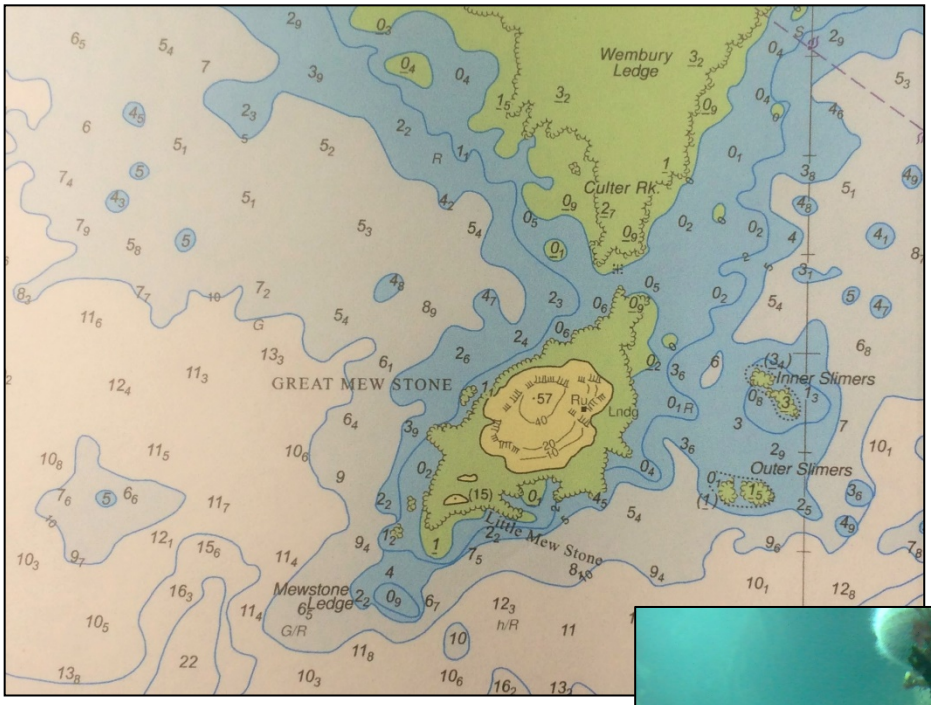
TOTNES
Sub-Aqua Club

SHIPS Project

Mewstone Cannon Site
Project Report



Mewstone Cannons
Project Report
October 2018

Background

The Great and Little Mewstone are small rocky islands with steep shelving faces that lie near the eastern entrance to Plymouth Sound (see Figure 5 for location plan), to the south west of Wembury Beach. From the little Mewstone a rocky outcrop known as the Mewstone Ledge continues some 400m towards the south west.

The shallow waters around the Mewstone have always been a favourite place for divers to explore as it is easy to get to, the visibility is often good and the reef attracts a lot of fish. In 1968 Dick Middlewood from Croydon Branch BSAC discovered two cannons lying in a gully on the Mewstone Ledge with another gun lying nearby. After attending one of the School for Nautical Archaeology Plymouth (SNAP) courses run at the Citadel in Plymouth he and a fellow Croydon diver, Dennis Hinchcliffe, decided to set up a project to investigate the site. Also on the course were Martin Dean and Dick Johnstone from Slough Sub-Aqua club who were also keen to get involved, and so began a collaboration between the Croydon and Slough BSAC clubs to explore and map the Mewstone site.

The site is a challenging place to work as it consists of deep, steep sided gullies topped with thick kelp, one gully looks very much like another so it is not easy to find your way around. The site is also very large, covering an area at least 75m by 50m, which made creating a site plan a laborious task.

John Smart from Gwynedd Branch BSAC also joined the team and together with Dean they surveyed the site for two weeks in August 1969. While mapping the site they located more cannon and anchors of different sizes along with a large amount of broken coarse pink pottery.

The ten heavily eroded and concreted cannons found by the team were all positioned on the site plan and each gun was recorded in detail. Two anchors were also found, both a typical Admiralty longshanks design with pointed crowns and straight arms, originally fitted with a wooden stock.

The work done by the original team was done without the aid of modern methods and technology but they still produced a good site plan (Figure 1) along with a very detailed and high quality archaeological report. The team's efforts and methods were commendable and in 1970 the Croydon Branch was awarded the Duke of Edinburgh's prize for their survey of the Mewstone Ledge wreck site.

The site was revisited in 1991 by the Archaeological Diving Unit (ADU), English Heritage's Diving Contractor, whose diving team included Martin Dean from the original 1969 survey. A short report was produced which concluded that at least one cannon had been moved or removed since the previous survey.

The Shipwrecks and History in Plymouth Sound (SHIPS) Project team dived the site in 2015 and identified a further 2 cannons that were not recorded on the 1969 plan, but these were not accurately located (it is possible that these were guns 6 & 7 from the 1969 survey).

Acknowledgements

The project team would like to thank the British Sub-Aqua Jubilee Trust (BSAJT) for its generous financial support, and also Mallory Hass and Peter Holt from the Ships and History in Plymouth Sound (SHIPS) project for their invaluable assistance.

Copyright Statement

Objectives

The objectives of the current project are as follows:

- To relocate, tag and record all the cannon and anchors from the original 1969 survey, and to obtain precise positioning for them using modern GPS equipment.
- To resurvey the site to verify (or otherwise) the accuracy of the conclusions of the 1991 ADU survey that a cannon has been removed or moved.
- To extend the 1969 survey to cover a larger area and to accurately locate two additional cannon identified by the SHIPS team in 2015, which may be guns 6 & 7 from the 1969 survey, and an additional cannon to the south of guns 1,2 & 3, and any other cannon or anchors, and to add these to the site plan.
- To extend the 1969 survey to the east/southeast where the SHIPS team have found a large area of untouched pottery fragments in deeper water, but only limited diving was conducted in this area, and also to the southwest where pottery fragments have been found up to 300m off the main site. The area to the northeast also remains largely unexplored.
- To train members of the dive team to undertake underwater surveys, cannon recording, documentary research and other archaeological skills.
- To undertake research to try and identify the identity of the wreck.

Site Description

The Mewstone Cannon site lies on the east side of the shallowest point on the Mewstone Ledge, 340m south-west of the Great Mewstone. The depth to the bottom of the gullies is approximately 10m plus tide height but the topography of the site varies considerably with gullies that are 2-3m deep. The shallowest part of the reef is to the east of the site and another shallow area lies to the south, but the reef then drops off into deeper water to the south and to the east. To the north the seabed gets a little deeper before rising up to the Mewstone itself.

The seabed is predominantly rock topped with thick kelp. At the bottom of the gullies and under the larger boulders can be found small sand and silt patches which occasionally contain fragments of coarse red pottery. The guns and anchors from the ship lie at the bottom of the gullies, they are hard to see as they are covered in a thick concretion and topped with weed and marine growth.

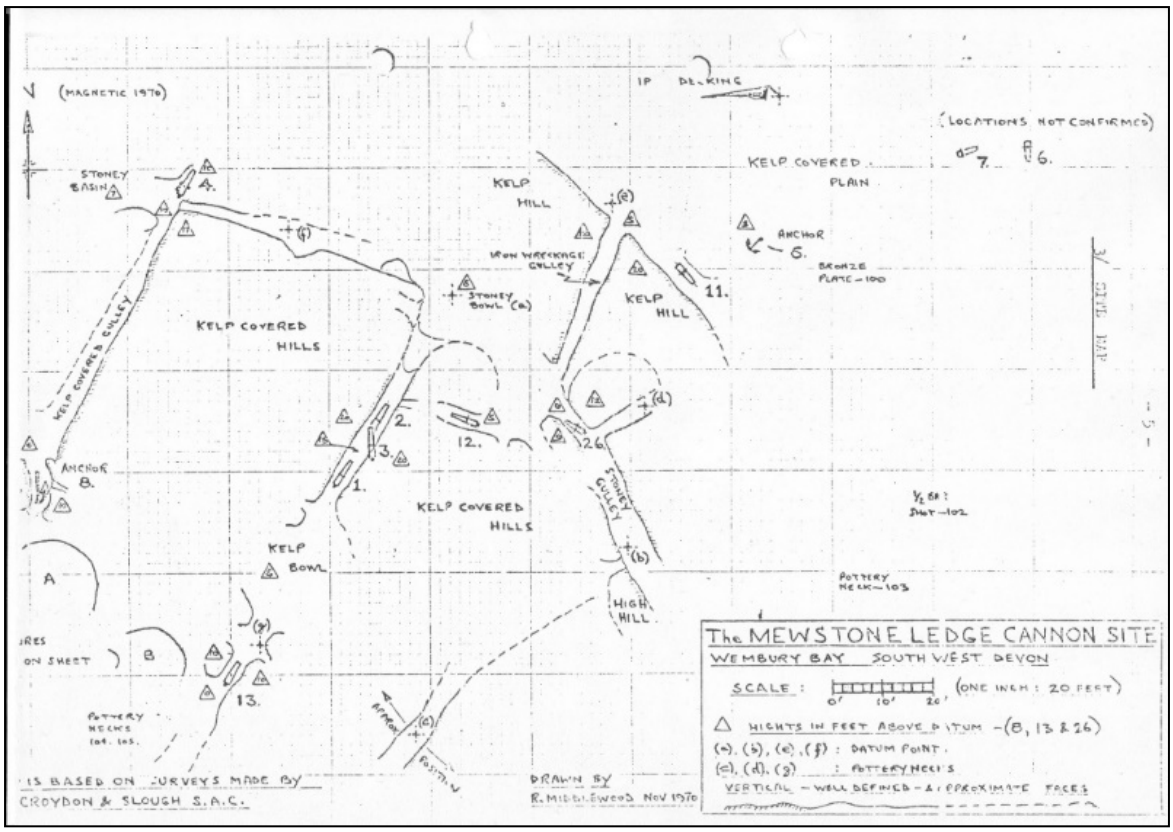


Figure 1: Site plan from 1970 Mewstone Ledge Site Report © R. Middlewood

Legal Status

The site does not have any protected wreck status, although it is on the edge of the Wembury Voluntary Marine Conservation Area (WVMC) and the Plymouth Sound and Tamar Estuaries European Marine Site, which is designated as both a Special Area of Conservation (SAC) and a Special Protection Area (SPA) and also the Start Point to Plymouth Sound & Eddystone SAC/SCI/cSAC.

Research

Unfortunately the project coincided with the closure of Plymouth City Museum and Central Library for a major refurbishment project which will not be completed until 2020. In addition, the Plymouth and West Devon Archive only has limited information for the likely period of the wrecking (anticipated to be sometime between 1750 and 1820). The requirement to register vessels over 15 tons burthen, not used solely on inland waters, was introduced in 1786. The original registers for the Port of Plymouth from 1786 to 1823 are lost and copies forwarded to the Commissioners for Customs in London prior to 1814, did not survive the great Customs House fire of 12 February 1814.

Initial research was been undertaken using a variety of secondary sources:

- Larn, R. & B., 1997, Shipwreck Index of the British Isles: Volume 1, Lloyds Register of Shipping
- Grocott, T., 1997, Shipwrecks of the Revolutionary & Napoleonic Eras, Stackpole Books

- Gosset, W.P., 1986, The Lost Ships of the Royal Navy 1793-1900, Mansell Publishing
- Hepper, D., 1994, British Warship Losses in the Age of Sail 1650-1859, Jean Boudriot Publications

Enquiries were also made with Richard Larn OBE who reviewed his extensive archives for information relating to the Mewstone site, but without result. The SHIPS Project archives were also consulted and the team are in discussion with the Charlestown Shipwreck and Heritage Centre to see if they have any artifacts from the site within their collection.

Site Plan

The first task was to collate all existing survey material relating to the site and to prepare a base plan on which to add the results of the new surveys. This allowed comparisons to be made with the 1969 survey and any new finds to be recorded (Appendix A).

Equipment

All survey dives were undertaken from boats belonging to Totnes BSAC, other than one occasion when a local hardboat was used.

Prior to commencing the surveys it was necessary to arrange for the manufacture of new purpose made stainless steel callipers for measurement of the cannons, together with the purchase of other survey equipment including tapes, folding rules, slates, waterproof paper, etc (Figure 2).

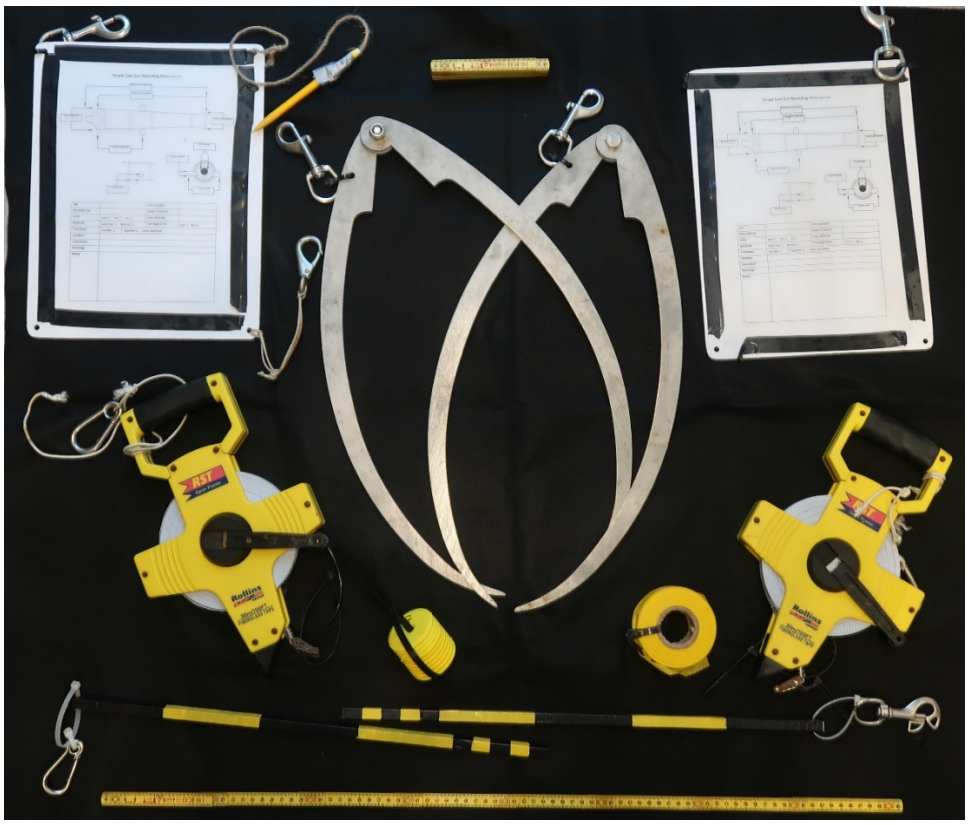


Figure 2: Photograph of some of the survey equipment purchased for the project

A later purchase was a GoPro video camera to allow better data capture in the narrow gulleys than could be achieved using conventional stills photography (generally the underwater cameras used were owned and used by individual team members, but all images and survey findings were agreed to be the property of the Mewstone Cannon project).

All divers provided their own diving equipment.

Training

A workshop was held in early 2017 to bring the team together to explain the purpose of the project and to provide site orientation (Figure 3). Training on basic survey techniques was also provided to those members of the dive team without previous experience in underwater archaeology, as detailed below.

Figure 3: Cannon recording workshop at Totnes

Training consisted of the divers learning a range of skills from search methods, recording practices, underwater photography, equipment instruction, finds identification, and updating of site plans.

The dive team was taught search methods for identifying new areas of interest, where cannons and pottery had not been previously recorded. The search methods included circular search and transits. The circular search is one of the most effective ways for divers to search areas of seabed and to position any objects found during the search. The method does not require any complicated equipment, is easy to learn, is very quick to set up and can be used in poor visibility on any type of seabed. The basic principle of a circular search is for divers to carefully search the seabed in a circular pattern at a known distance around a shot weight that marks the centre of the search area.

Divers were trained to record cannons above and below water, using tapes and callipers. Practicing above water allowed the divers to first ask questions and practice with the equipment before applying the newly learned skills to the Mewstone Cannon Site. All skills needed to record the Mewstone Cannon Site were first practiced dry so that there would be fewer errors in the information gathered from the team's survey of the site.

The dive team spent a half day learning how to identify and date finds that have been recovered from the Plymouth area. This helped the divers to understand how finds can aid

with the identification of wrecks by being able to narrow down the likely date range for the wrecking.

The divers were shown how to photograph cannons and finds in-situ and make a quick sketch of newly identified material, so that the newly found finds could be properly recorded at a later date.

A number of the team also attended a joint IMASS/Basiliscoe one day short course on historic artillery in February 2018. This course aimed to give participants a basic understanding of artillery (pre-1820) so that they can acquire the relevant information from a barrel and do a basic identification as to type, size, origin and dating.

Diving

The Mewstone Cannon site has particular challenges due to the shallow tidal nature of the site, with narrow gulleys and kelp covered rock flats above, and the site is undiveable (for effective survey operations) if there is any significant swell due to its shallow nature and also the difficulties of safe diver recovery adjacent to the Mewstone itself. Unfortunately, swell and bad weather were a significant issue during 2017 and the early part of 2018 with only 3 of the 15 diving days planned on the site actually taking place. However, the team were able to practice some of their survey techniques on more sheltered sites within Plymouth Sound including the wrecks of HMT Abelard, the Kingston Alalite and Hopper Barge No. 42.

Figure 4: One of the Totnes dive boats above the wreck site

The summer of 2018 was much kinder weatherwise (Figure 4). However, the swell still caused a number of dives on the site to be cancelled, or relocated to various magnetometer targets that the SHIPS project requested us to investigate, including a series of targets in Batten Bay and on Asia Shoal. In total approximately 80 hours of dive time have been logged on the project to date.

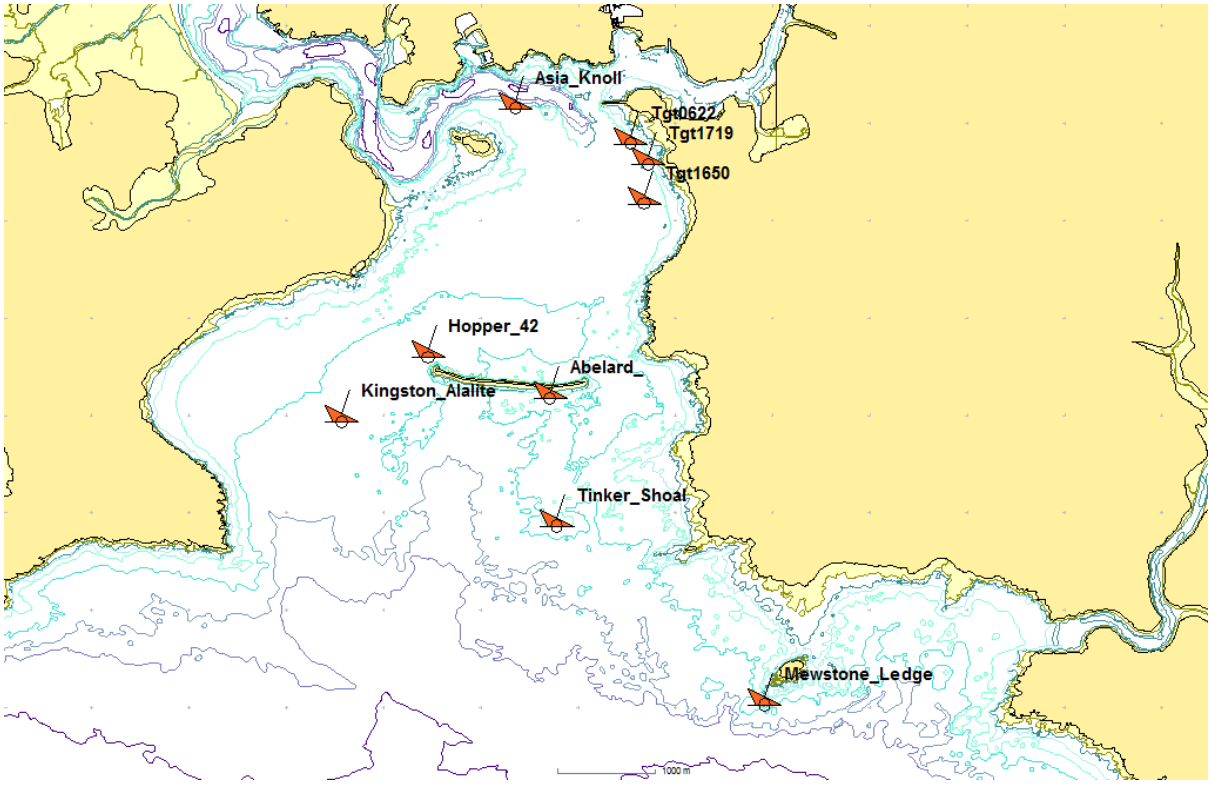


Figure 5: Plan showing sites dived during 2017-8 diving seasons

Initial dives were required to clear some of the kelp (the original plan was for dives to be carried out in the spring/early summer, prior to kelp regrowth, but in practice the bulk of the diving was done in the summer months when diving conditions on the site were most favourable), and to relocate and tag the known cannons and anchors This allowed the follow-on divers to have certainty regarding the objects being surveyed, and also to allow for recognition of “unknown” artefacts that hadn’t previously been tagged. Tagging was by means of numbered yellow survey tags attached by means of large removable cable ties, and also biodegradable flagging tape. Navigation lines were also laid between artefacts to enable the follow-on divers to quickly find the cannons and anchors they were tasked with recording.

The divers undertaking the follow-on survey dives carried tapes, rules and slates, and those undertaking the detailed gun recording, the purpose made stainless steel calipers to allow accurate measurement of diameter, bore, etc (Figure 6). Divers with underwater cameras also carried scale rods to allow detailed, scalable, record photographs of each gun and anchor, plus any other finds. All significant artefacts were photographed and measured in situ.

Figure 6: Divers undertaking tape and caliper surveys of a cannon

Copies of the survey records for the cannons and also for anchor 8 are included as Appendix B and a selection of the record photographs as Appendix C.

All diving was undertaken in accordance with BSAC Safe Diving Practices. A generic risk assessment for the project was prepared and is included as Appendix E. This was supplemented by “on the day” risk assessment by the Dive Manager.

The main site is 6-15m in depth, and reaches a maximum of 25-30m at the southern extremities of the larger site area. Diving was primarily conducted using air, although some divers opted to use nitrox. All diving was conducted by divers in buddy pairs, or, on rare occasions a team of three. All diving was undertaken as no-stop diving with individual divers using their personal dive computers to manage their dive profiles.

Pottery

Pottery has been recovered from the Mewstone Cannon site since the early 1960’s. When the 1969 survey was completed by SNAP the team recovered and recorded ten pieces of ‘pink earthenware’, their estimates at the time were of a minimum of seven jars on the wreck site. Their estimates were conservative because of their initial findings of only ten pottery shards; we can confidently say that the real number of jars carried by a ship in the oil trade would have been 10 times that number. Since the Mewstone site is a shallow dive and can be accessed easily when the conditions allow, hundreds of pottery shards are likely to have been recovered by divers in the last 40 years. Within the handling collection of the SHIPS Project they have a projected Minimum Number of Individual jars (MNIj) of twelve, and that consists of twenty diagnostic shards.

The areas identified in the original survey of 1969 to contain pottery shards was only a small section of the overall pottery debris. As can be seen in the site plan below, pottery shards cover a fair section of the south east area of the site; this was only recently identified in the last five years and reconfirmed by the current survey.

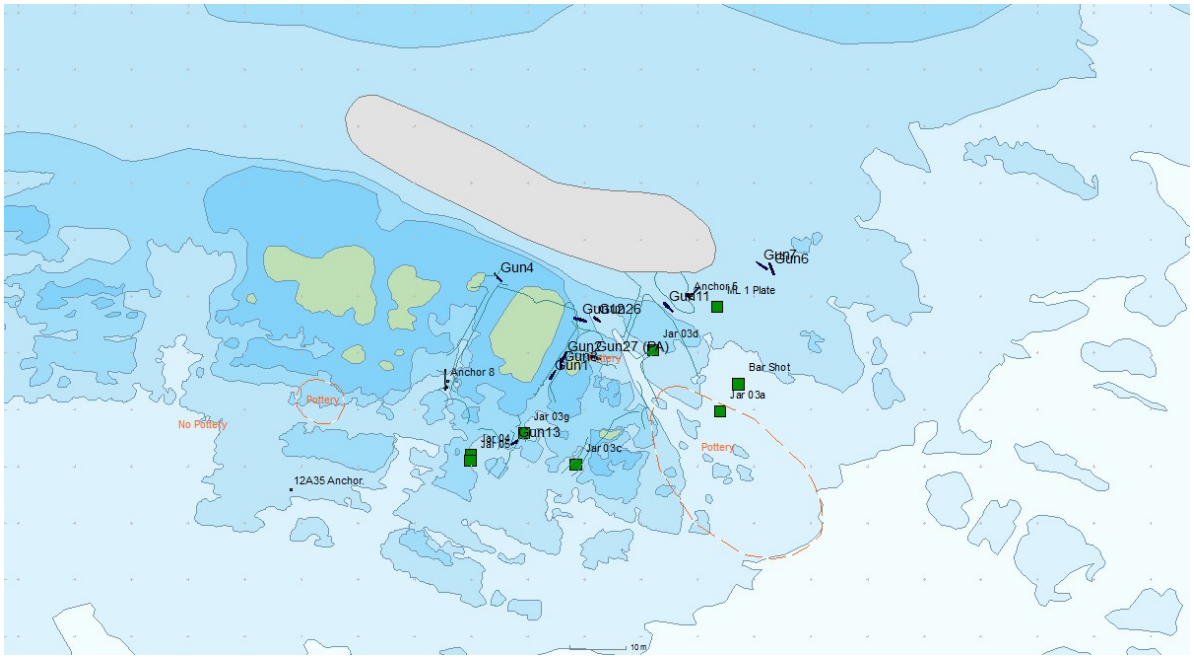


Figure 7: Site plan showing known extent of pottery shards

The jars have been identified by several experts to be olive oil jars (Figure 8), are a lead glazed simple out-turned rim with a lid that sits internally within the rim of the jar (Figure 9). The shoulders of the jar are flattened below the rim. High on the body are crescent shaped handles, these were used to turn the jar on its base, but the handles were not used to lift the jar.

From the original survey, several fragments of pottery were recovered with the merchant stamp of “IF” and “IN” (Figure 9). These stamps represent the name of the oil merchant or are marking symbols indicating the manufacture. These jars have been confirmed to be olive ‘oly’ jars from the merchants stamp and their earthenware composition.

The Royal Navy was the largest single customer for the Tuscan table oil imported into England throughout the 18th century. It is likely these jars were on their way to the Royal William Yard in Plymouth.

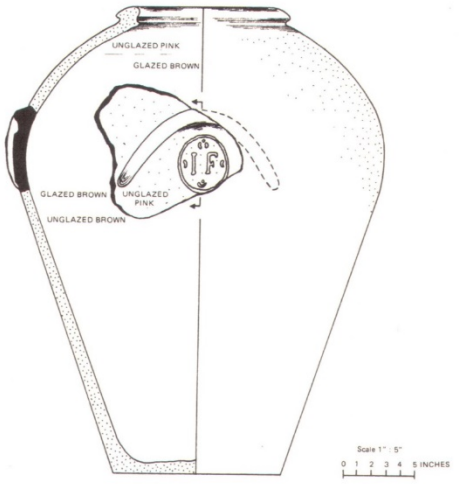


Figure 8: Illustration of an olive jar © SHIPS Project

The vessels vary in size but are within a vary degree of similarity indicated by the fragments that have been recovered. Complete jars still exist today with several of the shards matching these measurements of the jar shown here (height 740mm, average thickness 20mm).

Figure 9: Photographs showing merchant stamp IF on left and circular lid on right © SHIPS Project

Achievements

Table 1 below details the original project objectives and the outcomes achieved.

Table 1: Objectives and Outcomes

	Objective	**Outcome**
1.	To relocate, tag and record all the cannon and anchors from the original 1969 survey, and to obtain precise positioning for them using modern GPS equipment.	All the cannon from the 1969 were located and positioned, together with anchor 8. A shaft of what may have been anchor 5 was also located in the correct position. The team all developed new skills and succeeded in recording the artefacts on what was a challenging site for new amateur archaeologists due to the amount of kelp and swell at times.
2.	To resurvey the site to verify (or otherwise) the accuracy of the conclusions of the 1991 ADU survey that a cannon has been removed or moved.	All the cannon from the 1969 survey were located, suggesting that the conclusion of the 1991 survey that one of the cannon had been moved or removed was incorrect.
3.	To extend the 1969 survey to cover a larger area and to accurately locate 2	The survey area was extended and cannons 6 and 7 were accurately

	additional cannon identified by the SHIPS team in 2015, which may be guns 6 & 7 from the 1969 survey, and an additional cannon to the south of guns 1,2 & 3, and any other cannon or anchors, and to add these to the site plan.	positioned. It is noted that the orientation of the guns differs from the 1969 plan. Despite much searching no additional cannons were found, but this doesn't mean that they are not present as it would have been very easy to miss them with the dense kelp growth on the site.
4.	To extend the 1969 survey to the east/southeast where the SHIPS team have found a large area of untouched pottery fragments in deeper water, but only limited diving was conducted in this area, and also to the southwest where pottery fragments have been found up to 300m off the main site. The area to the northeast also remains largely unexplored.	The survey was extended to the northeast, south east, east and southwest and significant quantities on broken pottery identified, including one very large section of the side of a pot (see Figure 23 in Appendix C).
5.	To train members of the diver team to undertake underwater surveys, cannon recording, documentary research and other archaeological skills.	Team members were trained in various survey techniques, cannon, anchor and finds recording, as well as attending a workshop on the development and history of early naval artillery.
6.	To undertake research to try and identify the identity of the wreck.	To date we are no nearer being able to identify the wreck.

Future Work

This winter the dive team will be taught to use a marine metal detector, and several of the team how to use a handheld marine magnetometer. These skills will allow them to investigate the other gullies surrounding the site for additional material connected to the wreck and buried cannon. Unfortunately with the limited time on site for the 2017-2018 season the team was only able to complete the recording and positioning of the known cannons, but were not able to locate any additional cannons or anchors. The team will continue with the investigation of the Mewstone site to better understand how big the site is and how far the debris trail goes, especially as the kelp dies back in the winter.

Another avenue of research for the project is to potentially identify new material on the Mewstone Cannon Site that is not connected to the known wreck that was carrying the cannons. It is very likely that the metal detector survey will identify a various collection of objects that are not in context with the date of the Mewstone Cannons. This will help to better understand just how dangerous the Mewstone rocks were historically, and create a time line of material information that can be dated.

The team will also be participating is a Dry Skill Day course taught by The SHIPS Project over the spring of 2019. This course will enhance and refresh the team's base skills on searching, identifying and recording material on a wreck site. The course will be open to all Totnes BSAC members who would like to participate, allowing for new members to become active in the future work done to the Mewstone site.

Archival research will continue on trying to identify the name of the wreck carrying the olive oil jars and the cannons. The team has recently been looking into the Navy Royal Blue

Books on victualling, those specifically coming into the Royal William Yard, Plymouth. Because the pottery on the Mewstone site has been identified as olive oil jars with the merchant stamp of 'IF' it is likely the oil on board this vessel was being imported for the Royal Navy's use. It is the team's hope to connect the merchants name on a potential manifest of incoming goods to the Royal William Yard. There is also a chance that the Royal Navy at the time of wrecking made note of the loss in the accounts for that month and year, and stated what vessel was lost along with all her cargo.

Conclusions

Table 2 below records the identified positions of the cannons and anchors located during the recent works. These positions and orientations have been compared with the plan from the 1969 survey (see new site plan and overlay of 1969 and 2018 plans in Appendix A)

The 1969 survey did not have any of the modern technology we now take for granted when conducting a survey or even relocating a site. While there were inconsistences with the 1969 survey, the majority of the information recorded was very accurate. The 1969 survey has been compared with the SHIPS survey from 2005 and only slight inconsistences were noted, as in several of the cannons directions were recorded incorrectly. As a comparison to the Totnes survey and the 1969 survey, Totnes accurately recorded the positions of guns 6 & 7, the guns in the 1969 survey were 2m off from the positions recorded by the Totnes divers. The bearings for the guns were also incorrect in the 1969 survey, but the majority of the gun positions from the 1969 survey were accurate to within 1m. These results are impressive considering that the 1969 team did not have ready access to cameras, a GPS or geophysical survey equipment which has been used to survey and monitor the site for the last 10 years.

The Totnes team will continue to map the Mewstone Cannon Site, starting with a metal detector survey to investigating the gullies to the southern half of the site this coming winder season. The team will also conduct a survey looking for pottery shards to the south east of the main cannon site; this may help to explain the wrecking process and how far it extends. They will then use the hand held magnetometer to identify cannons that may be buried or are unidentifiable due to their current state, broken, eroded or deteriorated beyond recognition.

The Totnes team plans to continue this survey work throughout 2018 and into 2019. They will continue with their survey until they are satisfied with understanding the extents of the debris field.

Table 2: Position and orientation of the cannon and anchors

Name	**Latitude**	**Longitude**	**Orientation (Base ring to Muzzle)**	**Notes**
Gun 1	50 18.243N	004 06.598W	30	Single position for guns 1, 2, 3
Gun 2	50 18.243N	004 06.598W	50	
Gun 3	50 18.243N	004 06.598W	0	
Gun 4	50 18.248N	004 06.633W	300	
Gun 6	50 18.253N	004 06.592W	150	Single position for guns 6, 7

Gun 7	50 18.253N	004 06.592W	300	
Gun 11	50 18.251N	004 06.606W	150	
Gun 12	50 18.246N	004 06.624W	120	
Gun 13	50 18.237N	004 06.633W	60	
Gun 26	50 18.248N	004 06.618W	330	
Anchor 5	50 18.252N	004 06.606W		Possible shaft found
Anchor 8	50 18.242N	004 06.640W		

Project Team

The project team comprised divers from various BSAC branches, principally Totnes BSAC and Pilgrims SAC, together with divers from the SHIPS project.

Appendix D contains full details of the project team.

Project Partners

The SHIPS Project kindly provided research material to assist in the preparation of the project plan and report. Team members (many of whom are also members of Totnes or Pilgrims BSAC clubs) also assisted with some of the project dives and provided archaeological analysis of the site.

References

Archaeological Diving Unit, 1991, Report on the Cannon Site on the Mewstone Ledge, off Wembury, ADU 91/10
Ashdown J., 1972, Mewstone Ledge Site B: Oil Jars, International Journal of Nautical Archaeology 1972.1 p147-153
Coleman, A. Ronald, Conway Maritime Press, 2002, The Age of Sail, 'Olive 'Oyl' and the 18th Century Royal Navy
McDonald, K. & Cockbill, D., 1987, Dive South Devon – A Divers Guide, Underwater World Publications, p180-182
McDonald K., The Wreck Detectives, p 204
Middlewood R., 1970, Mewstone Ledge Site Report, privately published
Middlewood R., 1972, Mewstone Ledge site A. Summary of work and results, 1969-70, International Journal of Nautical Archaeology 1972.1 p142-147
Mitchell P., 1986: The Wrecker's Guide to South West Devon, Sound Diving Publications, Plymouth
PastScape, available at http://www.pastscape.org.uk/hob.aspx?hob_id=1527637
SHIPS Project Web Site, available at
http://www.promare.co.uk/ships/Wrecks/Wk_MewstoneLedge.html

Appendix A

Site Plans

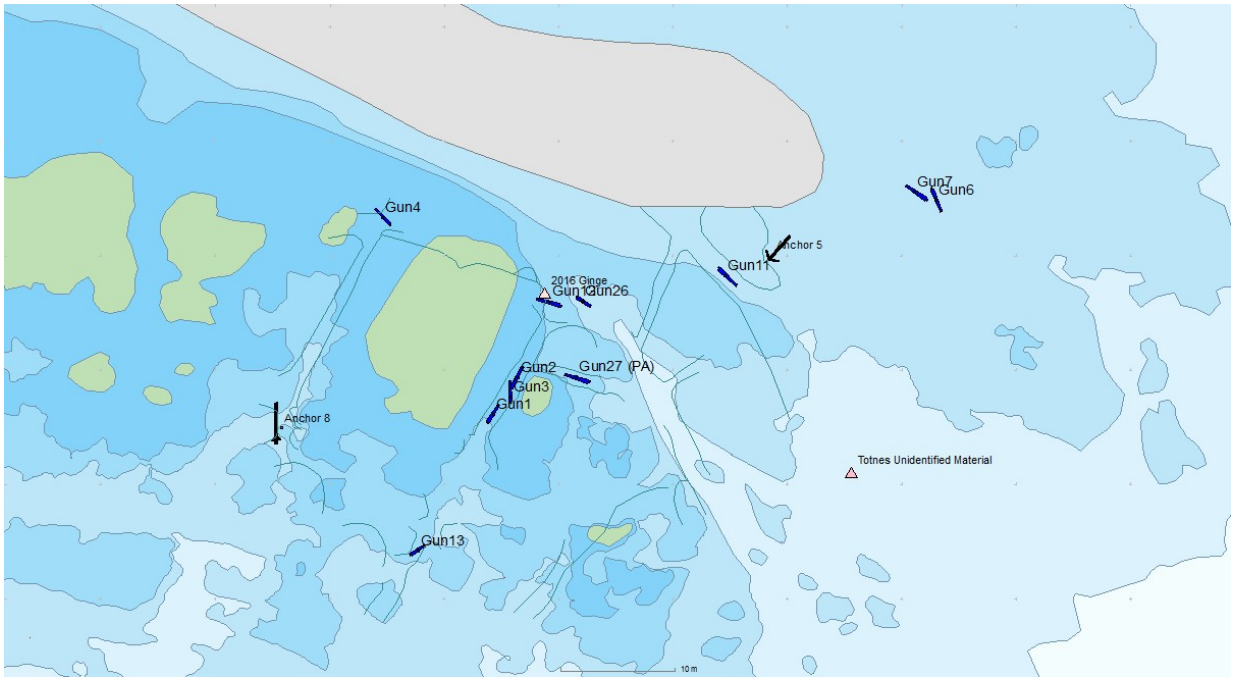


Figure 10: Updated Site Plan showing positions of cannons and anchors

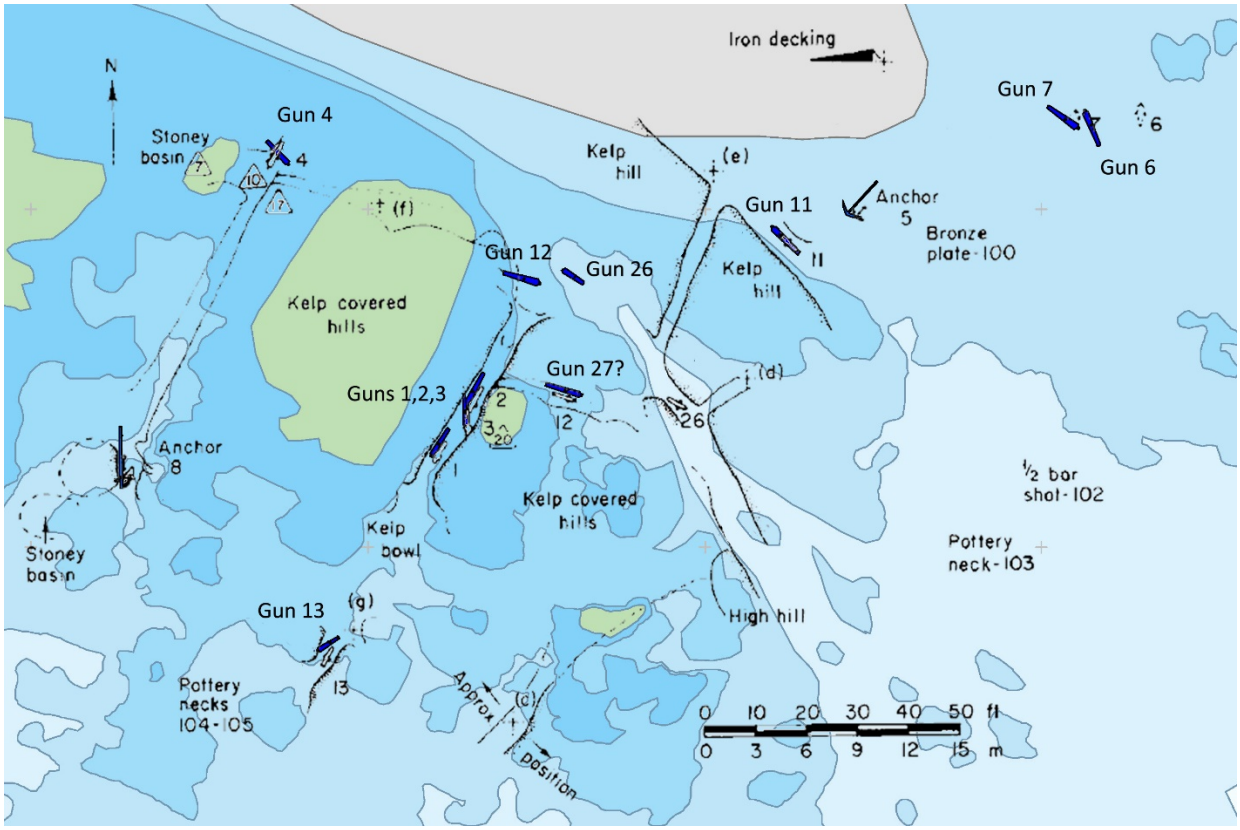


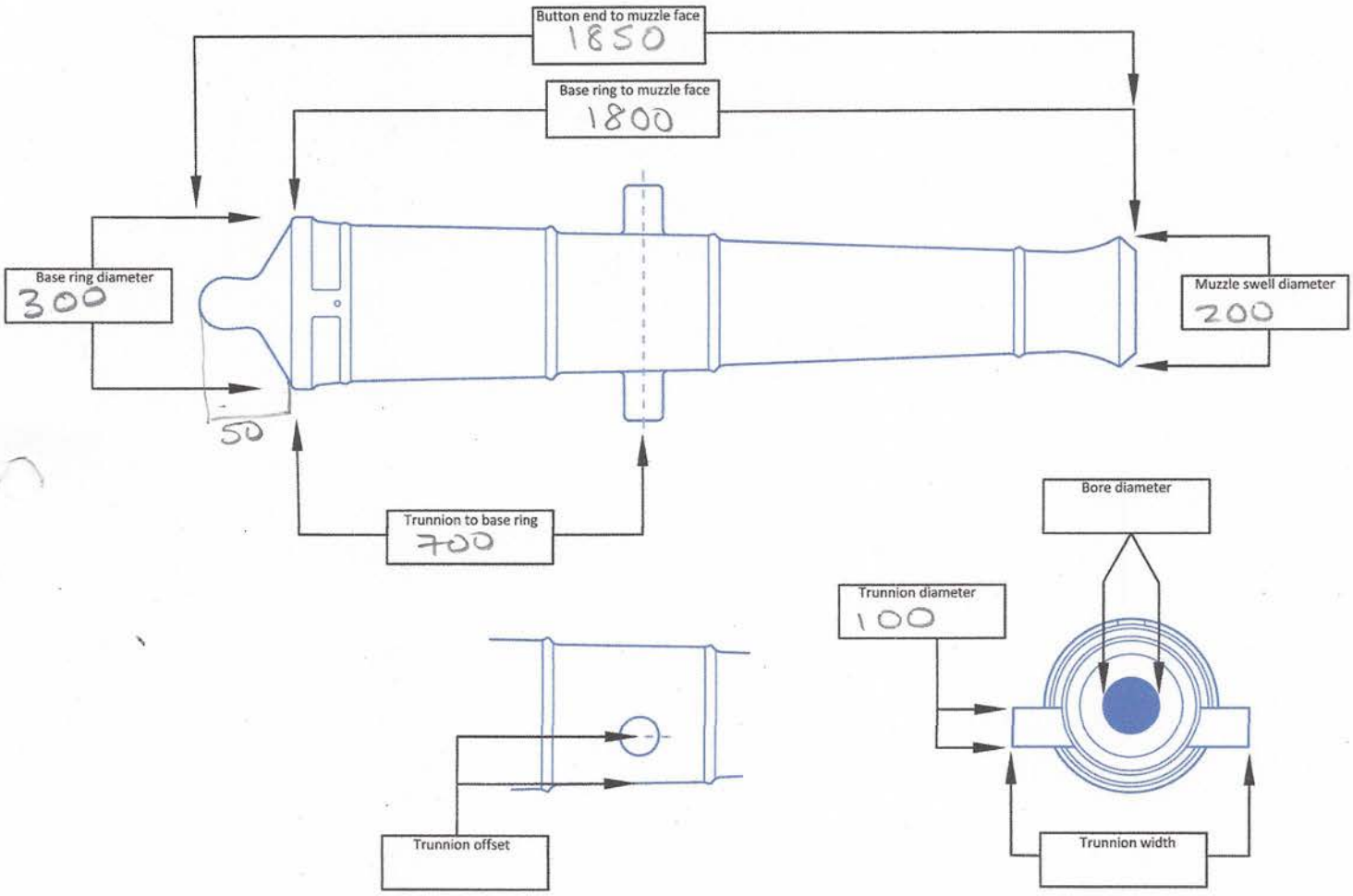
Figure 11: Updated site plan overlaid on 1969 site plan

Appendix B

Survey Records

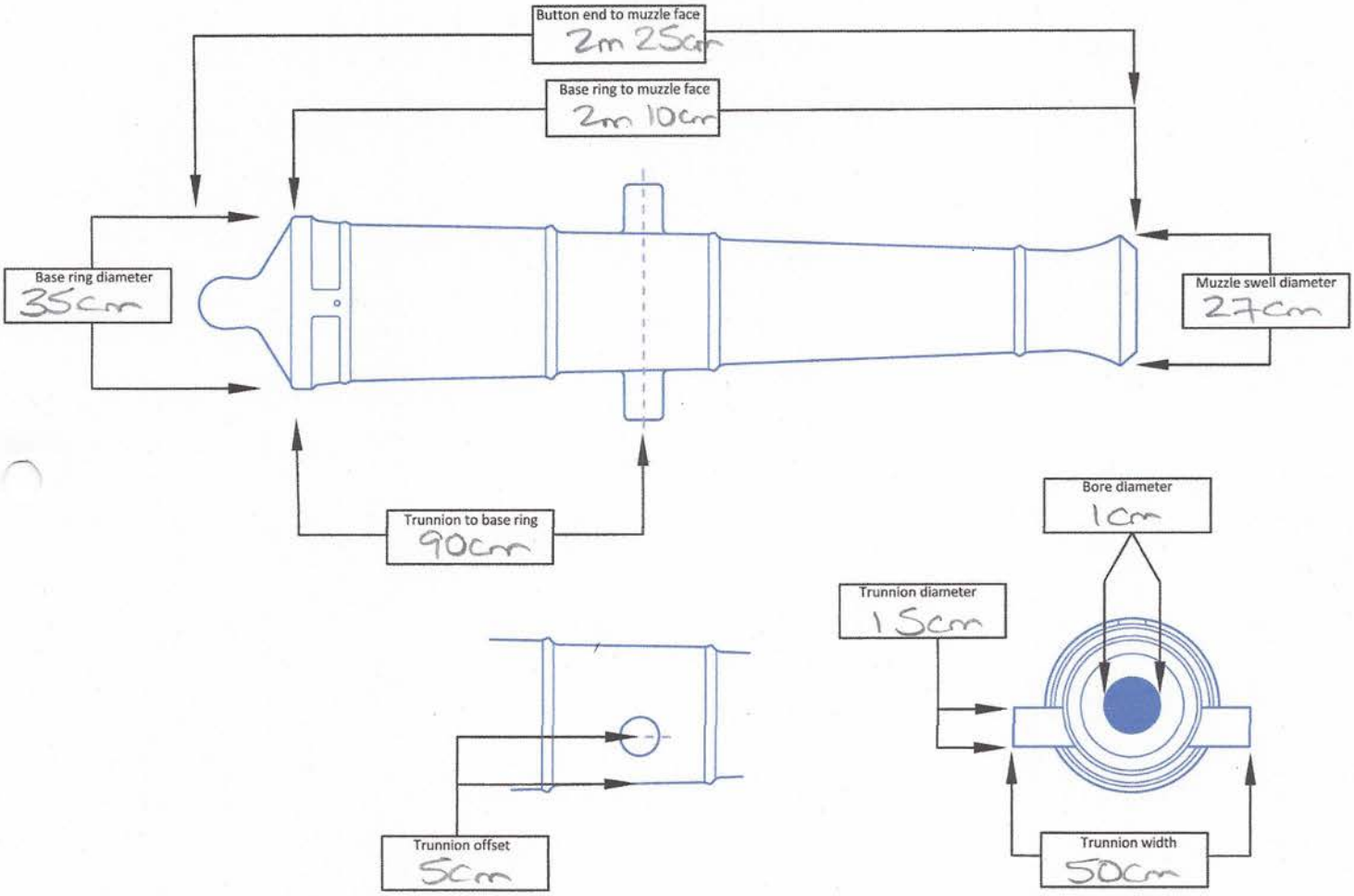
CISMAS Simple Cast Gun Recording Form

measurements in mm



Site	MEWSTONE CANNONS	Gun number	1
Recorded by	SARAH DASHFIELD ALEC JACOBS	Date of record	22-4-17
Units	mm ☑ cm ☐ m ☐	Gun attitude	
Material	Cast Iron ☑ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐	Tapered ☐ Inner diameter	
Location	50° 18.243 N 04° 06.624 W		
Alignment	Bearing (base ring → muzzle) 30°		
Concretion	LOD		
Markings			
Notes	Ran out of time getting cold. Had to record gun 1 on the same sheet as gun 3.		

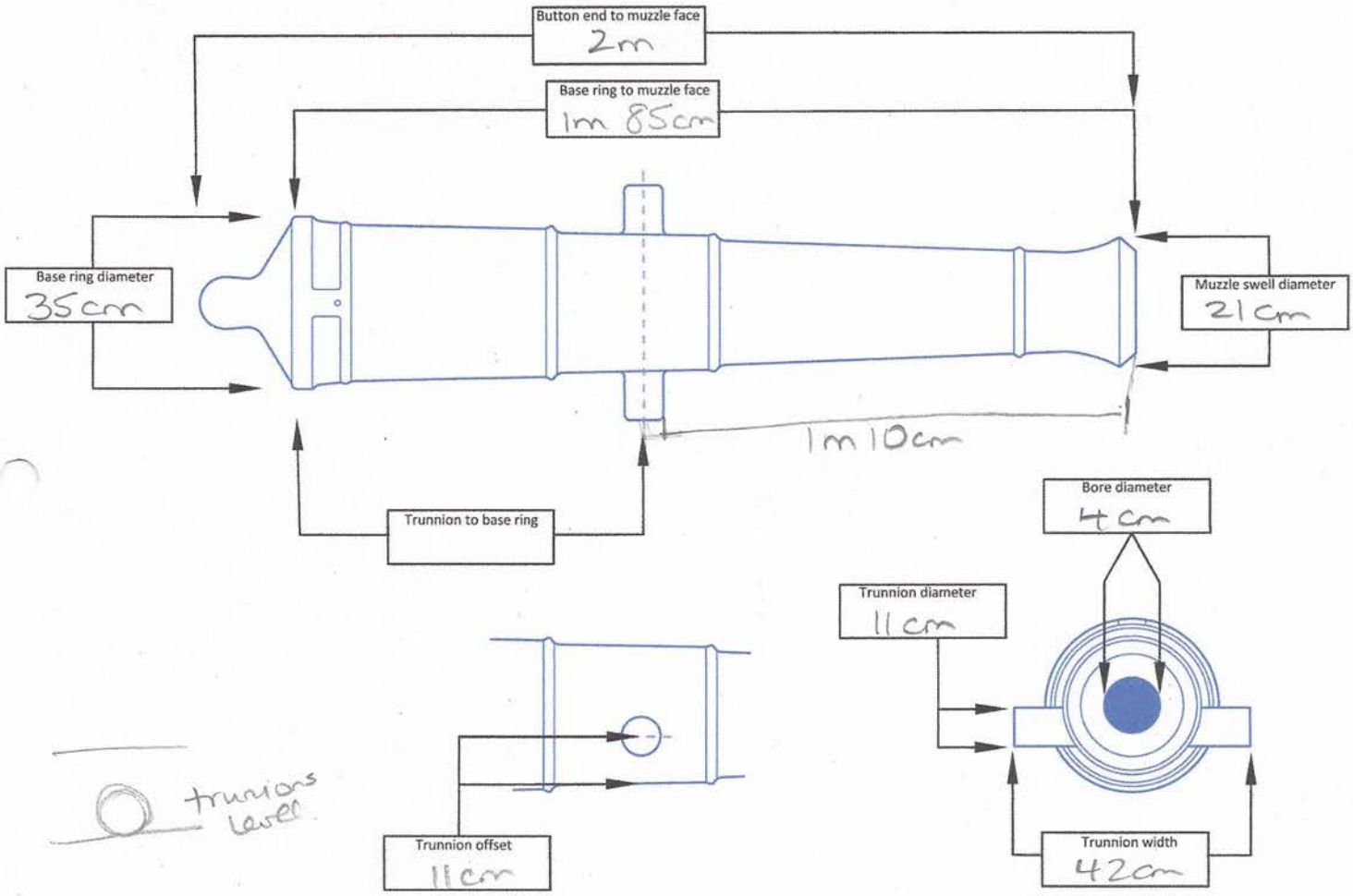
CISMAS Simple Cast Gun Recording Form



Site	MELSTONE CANNONS	Gun number	2
Recorded by	SARAH DASHFIELD ALEC JACOBS	Date of record	22-4-17
Units	mm ☐ cm ☑ m ☑	Gun attitude	
Material	Cast Iron ☑ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐	Tapered ☐ Inner diameter	
Location	Same as gun 1		
Alignment	Bearing (base ring → muzzle) 50°		
Concretion	lots		
Markings			
Notes			

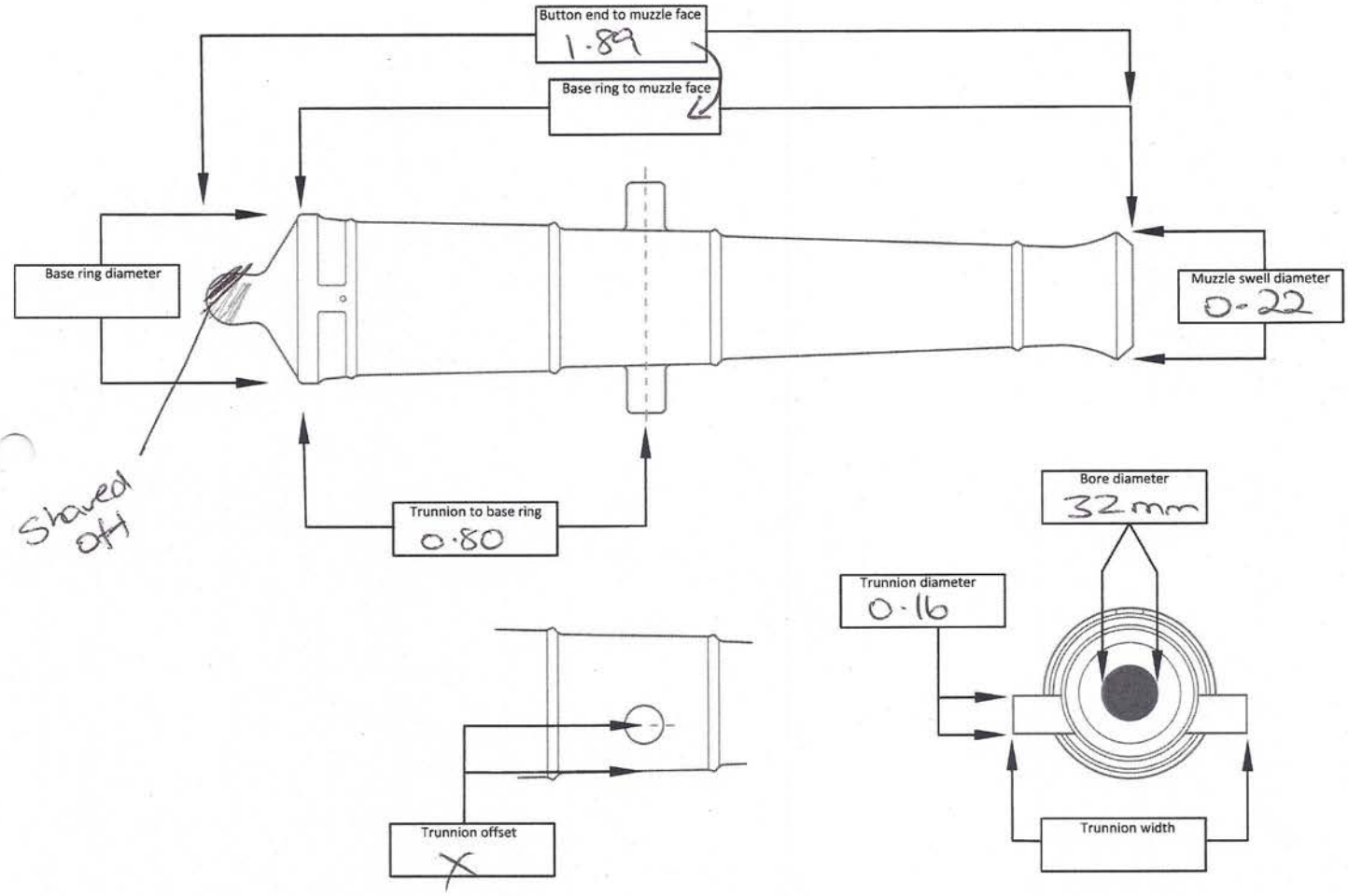
CISMAS (20.III.2015) V6

CISMAS Simple Cast Gun Recording Form



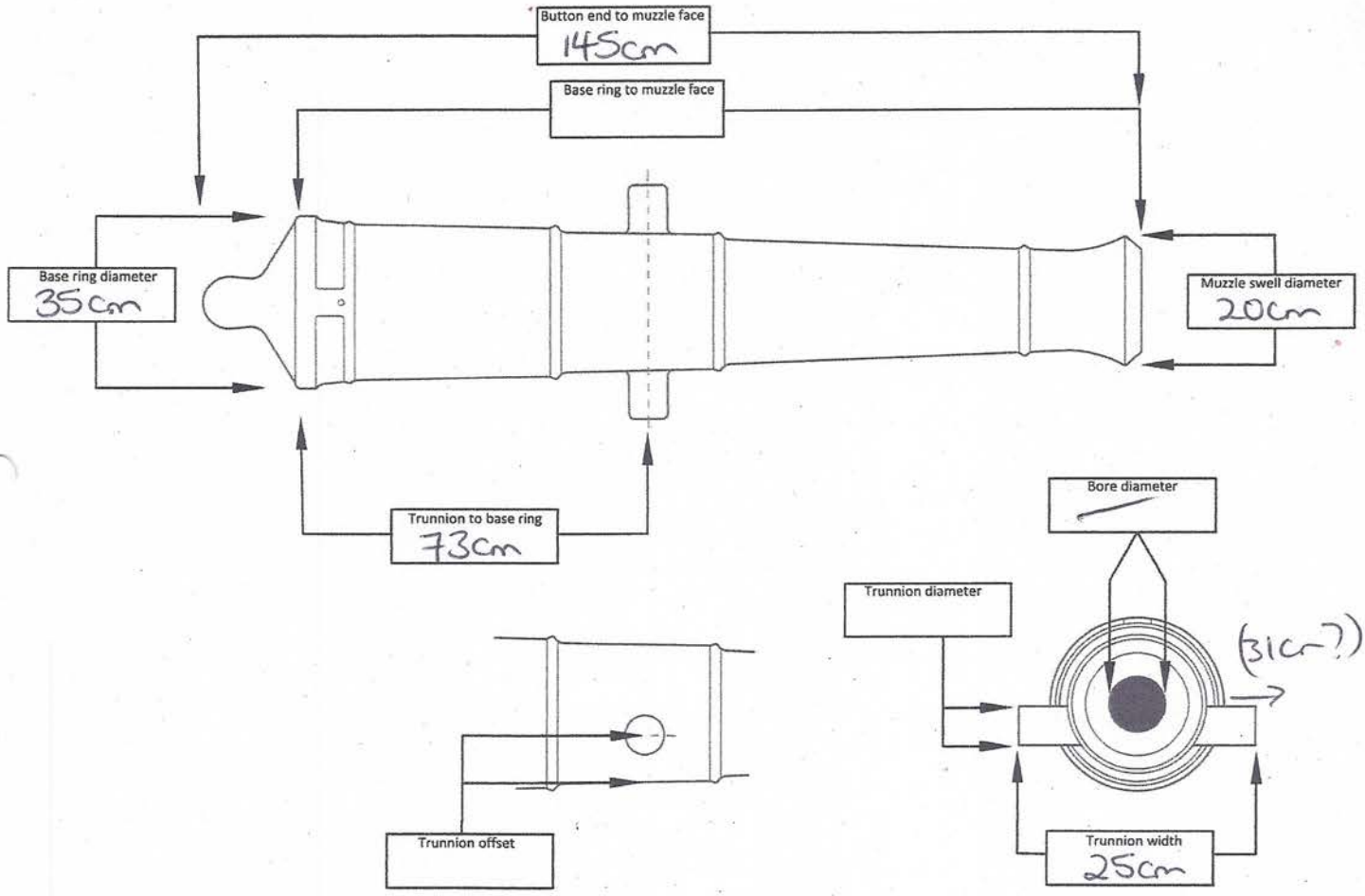
Site	MELVSTONE CANNONS	Gun number	3
Recorded by	SARAH DASHFIELD ALEC JACOBS	Date of record	22-4-17
Units	mm ☐ cm ☐ m ☐	Gun attitude	
Material	Cast Iron ☑ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐ Tapered ☐ Inner diameter		
Location	Same as gun 1		
Alignment	Bearing (base ring → muzzle) 0°		
Concretion	Fluke concretion		
Markings			
Notes			

Simple Cast Gun Recording Form [DRAFT V5]



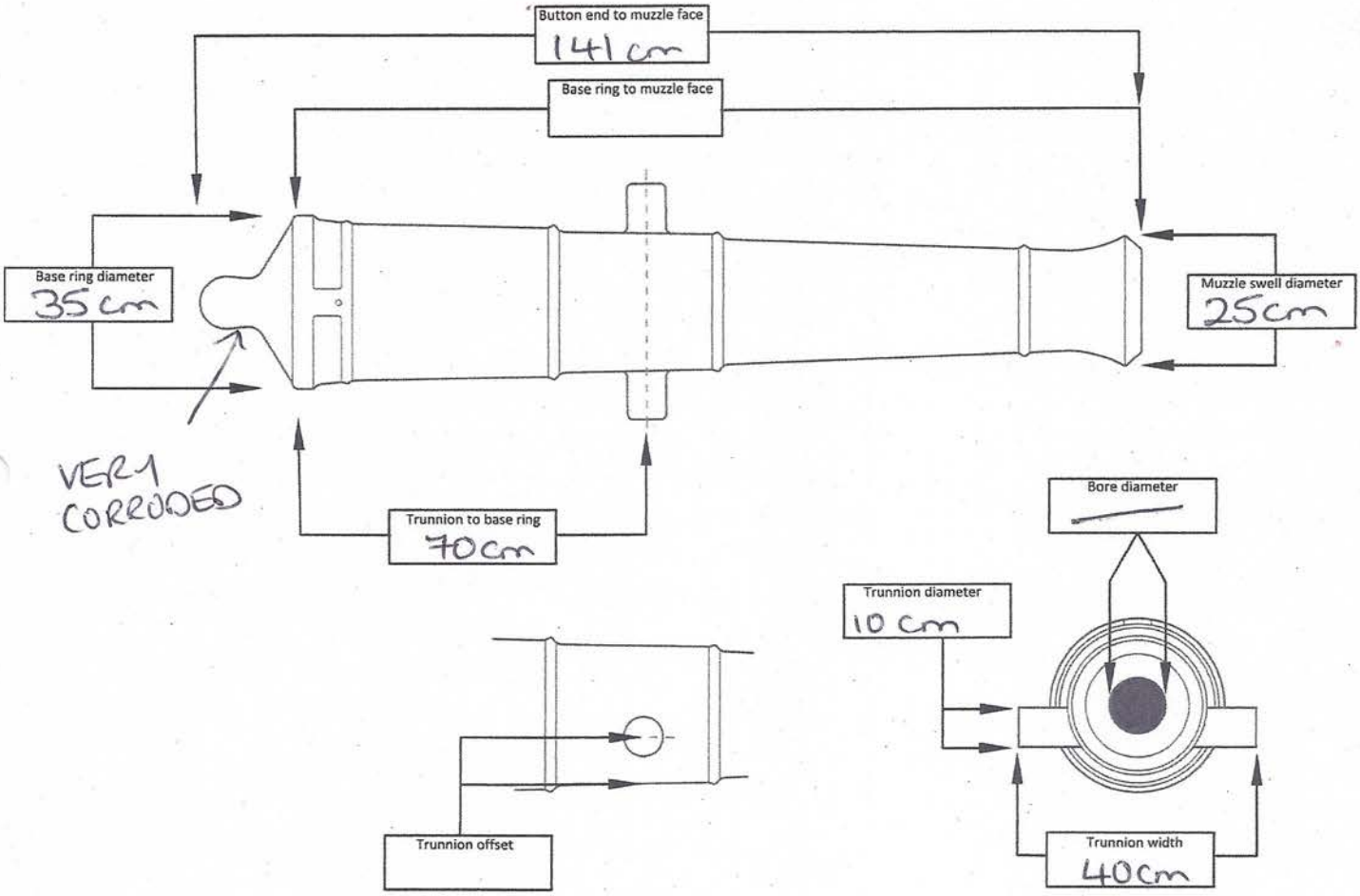
Site	Mewstone Cannon	Gun number	4
Recorded by	CdA Tudor	Date of record	7 May 2017
Units	mm ☑ cm ☐ m ☑	Gun attitude	
Material	Cast Iron ☑ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐ Tapered ☐ Inner diameter		
Location	50° 18.~~248~~ 252 N 04° 06.633 W		
Concretion	yes		
Markings			
Notes	muzzle North Bearing (base ring → muzzle) 300°		

Simple Cast Gun Recording Form [DRAFT V5]



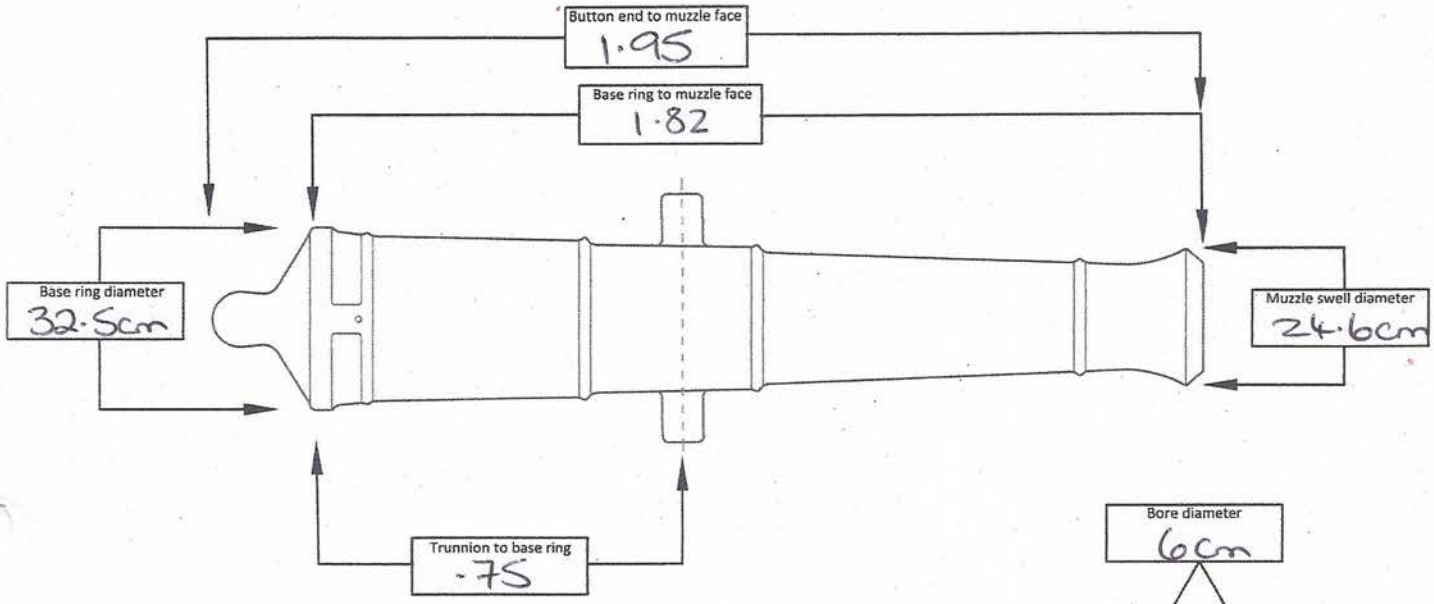
Site	PLYMOUTH MELSTONE	Gun number	6
Recorded by	Sarah + Alec	Date of record	23-5-18
Units	mm ☐ cm ☑ m ☐	Gun attitude	
Material	Cast Iron ☐ Bronze ☐	Carriage parts	Yes ☐ No ☑
Trunnions	Parallel ☐	Tapered ☐ Inner diameter	
Location	50° 18.253 N 04° 06.592 W		
Concretion			
Markings			
Notes	VERY POOR CONDITION COMPARED WITH OTHER CANNONS. Bearing (base ring → muzzle) 150°		

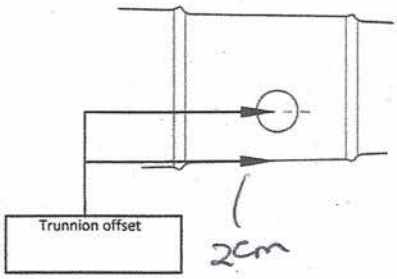
Simple Cast Gun Recording Form [DRAFT V5]



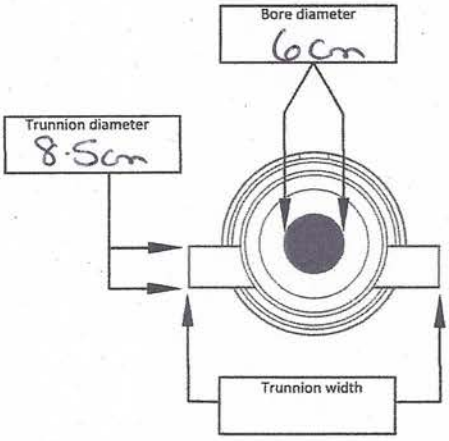
Site	MELSTONE CANNON	Gun number	7
Recorded by	SARAH + ALEC	Date of record	23-5-18
Units	mm ☐ cm ☑ m ☑	Gun attitude	
Material	Cast Iron ☑ Bronze ☐	Carriage parts	Yes ☐ No ☑
Trunnions	Parallel ☐	Tapered ☐ Inner diameter	
Location	same as gun 6		
Concretion			
Markings	NONE		
Notes	CONCRETED TO SEABED VERY POOR CONDITION DIFFICULT TO MEASURE VERY MUCH Bearing (basering → muzzle) 300°		

Simple Cast Gun Recording Form [DRAFT V5]



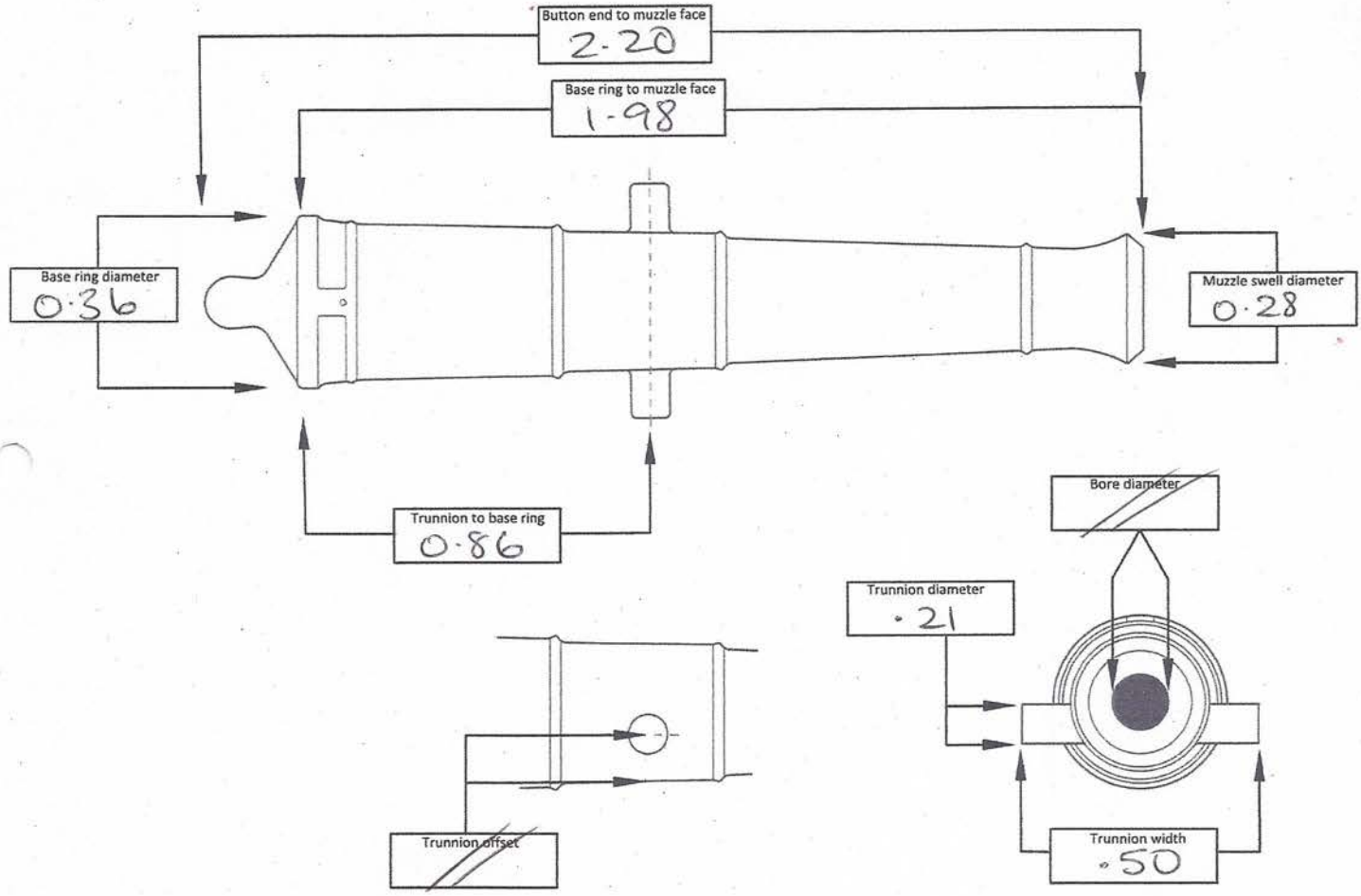


ON SIDE W/TRUNNION UP



Site	PLYMOUTH MELSTONE	Gun number	11
Recorded by	DOM + MAC	Date of record	23-5-18
Units	mm ☐ cm ☐ m ☐	Gun attitude	
Material	Cast Iron ☐ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐	Tapered ☐ Inner diameter	
Location	50° 18.251 N 04° 06.606 W		
Concretion			
Markings			
Notes	Bearing (base ring → muzzle) 150°		

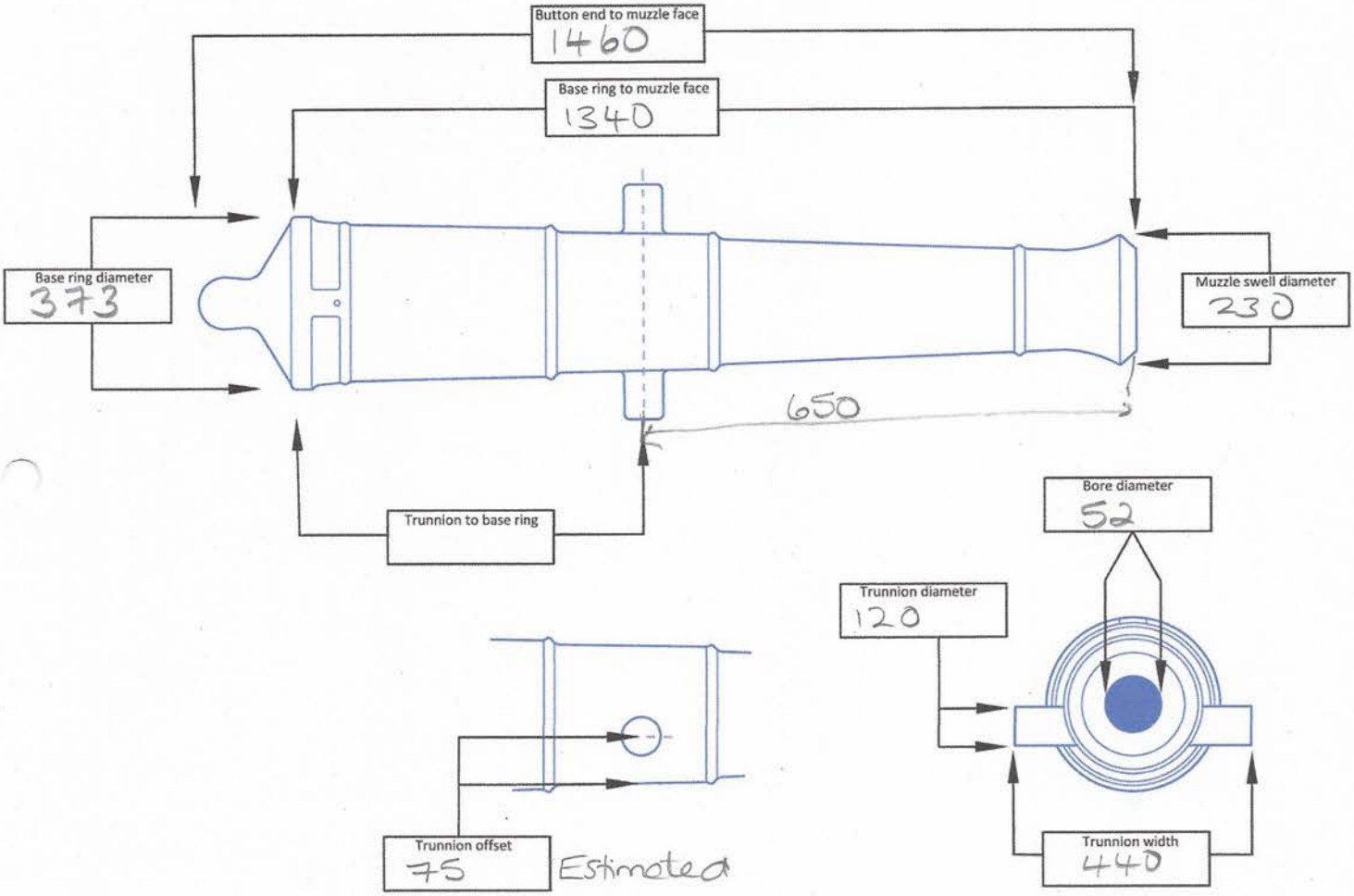
Simple Cast Gun Recording Form [DRAFT V5]



Site	Mewstone Cannon	Gun number	12
Recorded by	C+A Tudor	Date of record	7-5-17
Units	mm ☐ cm ☐ m ☑	Gun attitude	
Material	Cast Iron ☐ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐	Tapered ☐ Inner diameter	
Location			
Concretion			
Markings			
Notes	muzzle is SE Bearing (basering → muzzle) 120°		

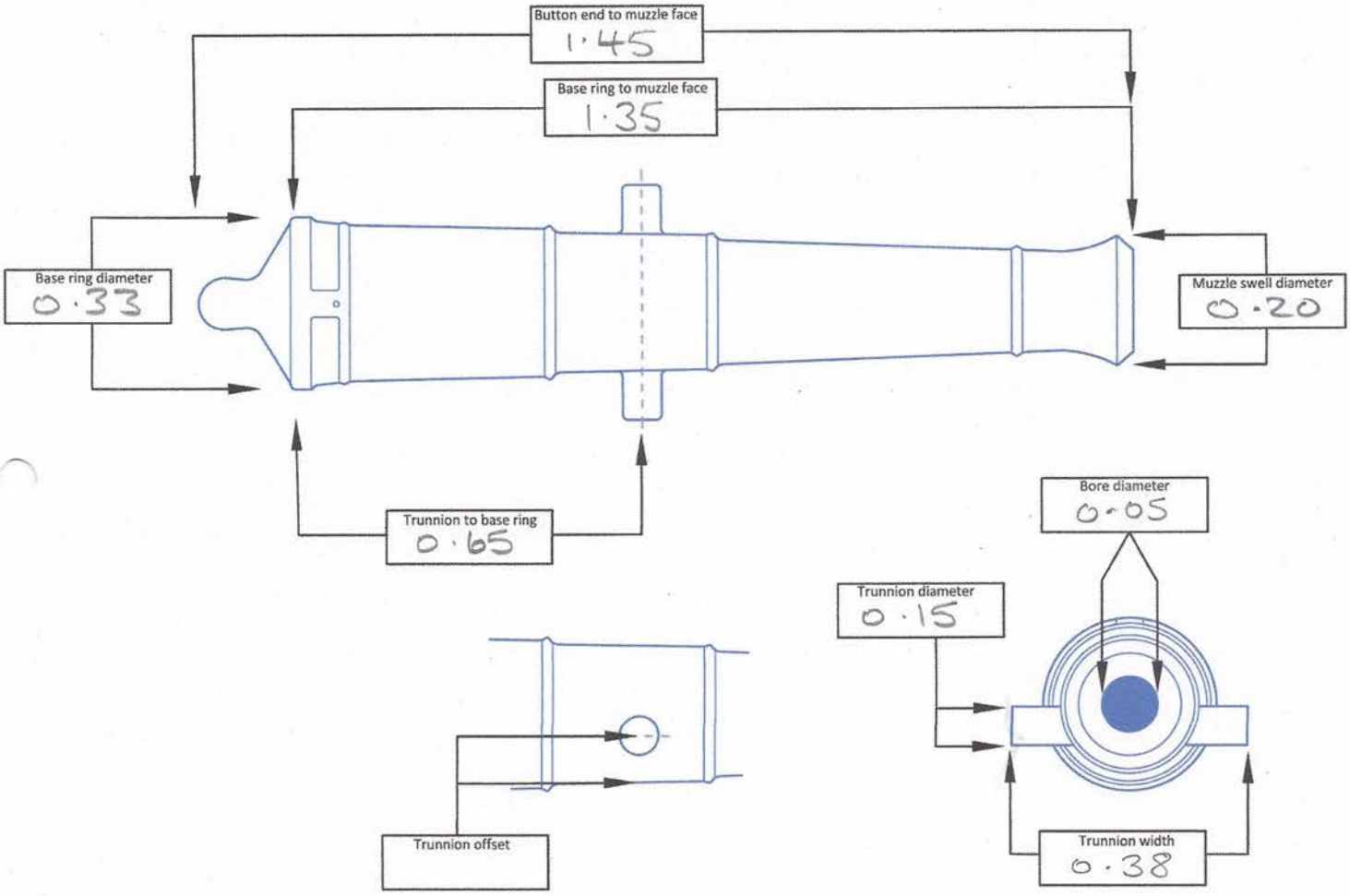
CISMAS Simple Cast Gun Recording Form

in measurements in mm



Site	MELSTONE CANNONS	Gun number	13
Recorded by	ALEC JACOBS RICHARD WOOD	Date of record	22-4-17
Units	mm ☑ cm ☐ m ☐	Gun attitude	
Material	Cast Iron ☑ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐ Tapered ☐ Inner diameter		
Location	50° 18·237 N ~~06° 06·6533~~ 04° 06·633W		
Alignment	Bearing (base ring → muzzle) 60°		
Concretion			
Markings			
Notes			

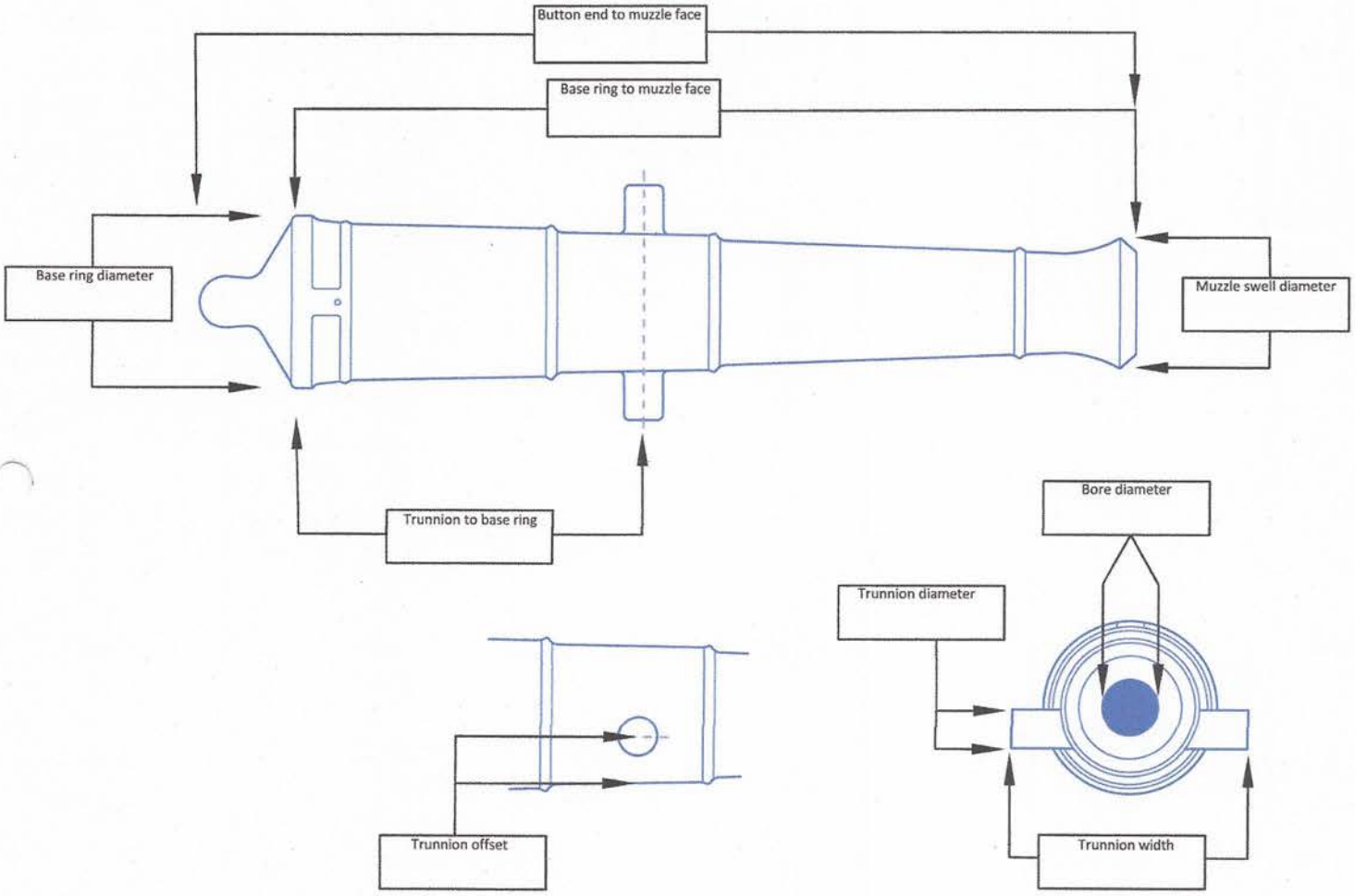
CISMAS Simple Cast Gun Recording Form



Site	MEWSTONE CANNONS	Gun number	26
Recorded by	CAROLE + ALLAN TUDOR	Date of record	22-4-17
Units	mm ☐ cm ☐ m ☑	Gun attitude	
Material	Cast Iron ☑ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐	Tapered ☐ Inner diameter	
Location	50° 18.248 N 04 06.618W		
Alignment	Bearing (base ring → muzzle) 330°		
Concretion			
Markings			
Notes	Initially thought this was cannon 12, but on further investigation Allen Murray discovered cannon 12 was under a ledge.		

CISMAS (20.III.2015) V6

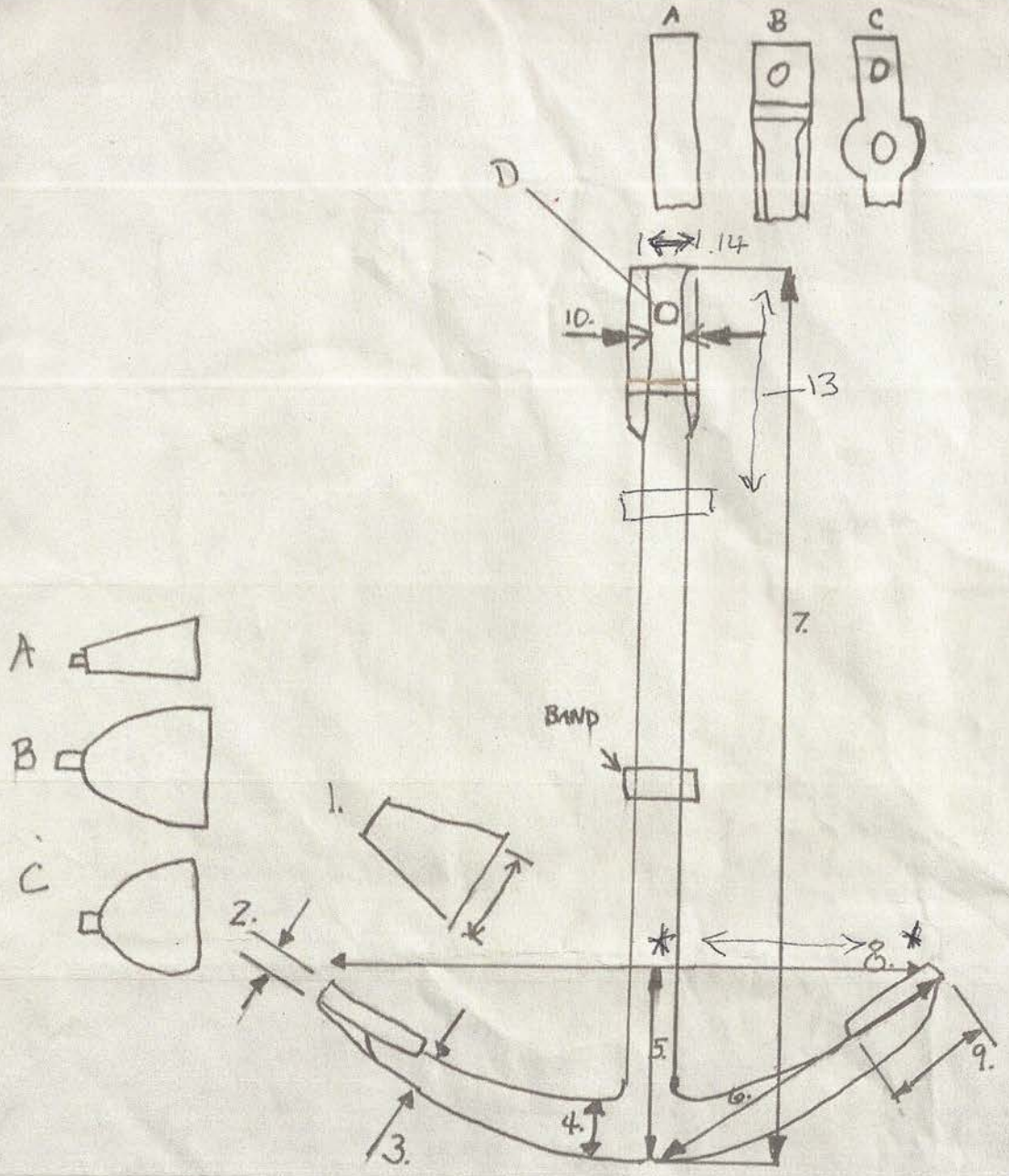
CISMAS Simple Cast Gun Recording Form



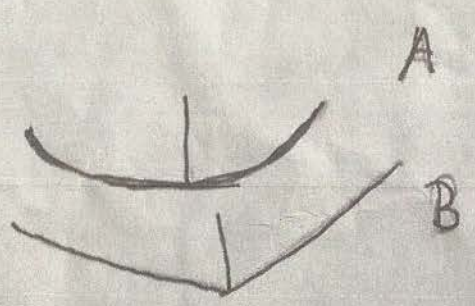
Site	MEWSTONE CANNONS	Gun number	26? (unnamed [illegible] no. 11)
Recorded by	CAROLE + ALLAN TUDOR	Date of record	22-4-17
Units	mm ☐ cm ☑ m ☑	Gun attitude	
Material	Cast Iron ☐ Bronze ☐	Carriage parts	Yes ☐ No ☐
Trunnions	Parallel ☐ Tapered ☐ Inner diameter		
Location	50 18.240 N 04 06.598 W		
Alignment	Bearing (base ring → muzzle)		
Concretion			
Markings			
Notes	1.9m long 135cm wide Referred to as Tudors Lump. GPS position is off the recorded site		

CISMAS (20.III.2015) V6

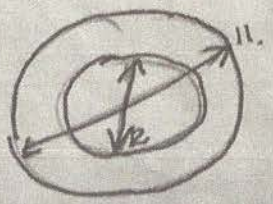
Anchor 8



1 _____
2 _____
3 _____
4 _____
5 55 cm
6 1m 12cm
7 3m 5cm
* 8 1m 5cm
9 _____
10 _____
11 _____
12 _____
13 47cm
14 20 cm



RING



* only 1 fluke showing, but can feel the other in sea bed.
Measurement is for ½ of anchor.

Appendix C

Record Photographs

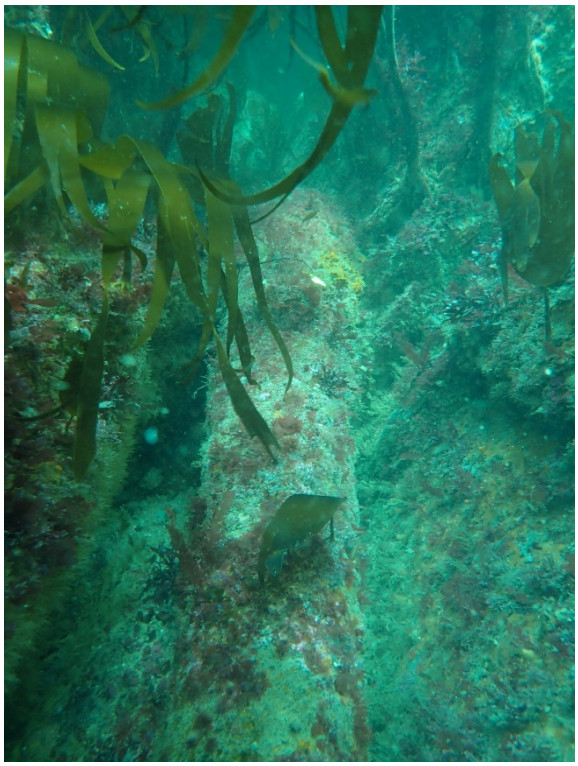


Figure 12: Gun 1

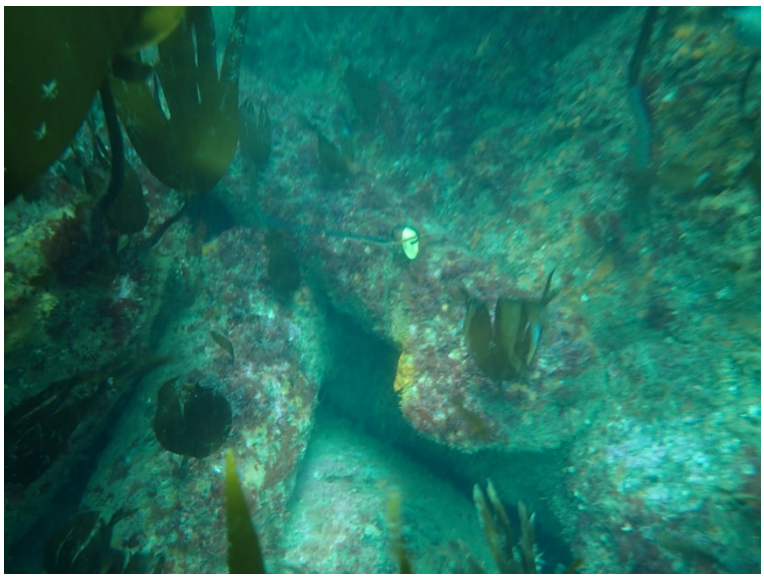


Figure 13: Guns 2 & 3

Figure 14: Gun 3

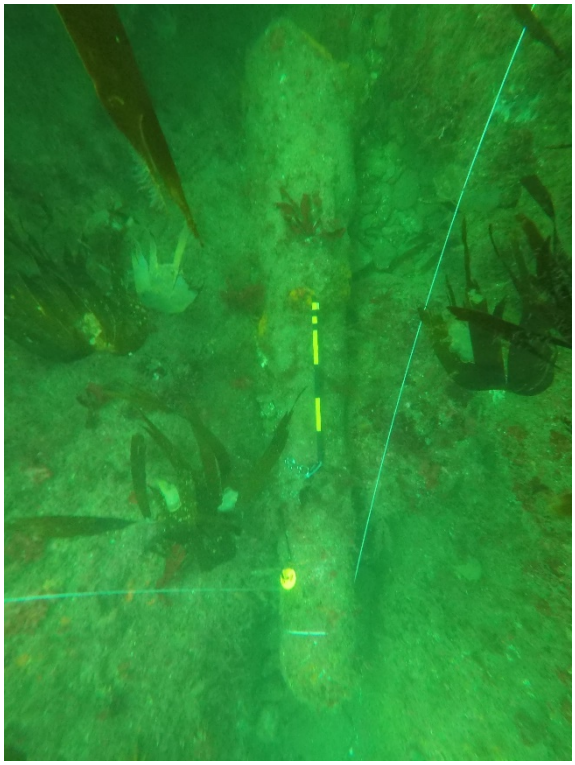


Figure 15: Gun 4

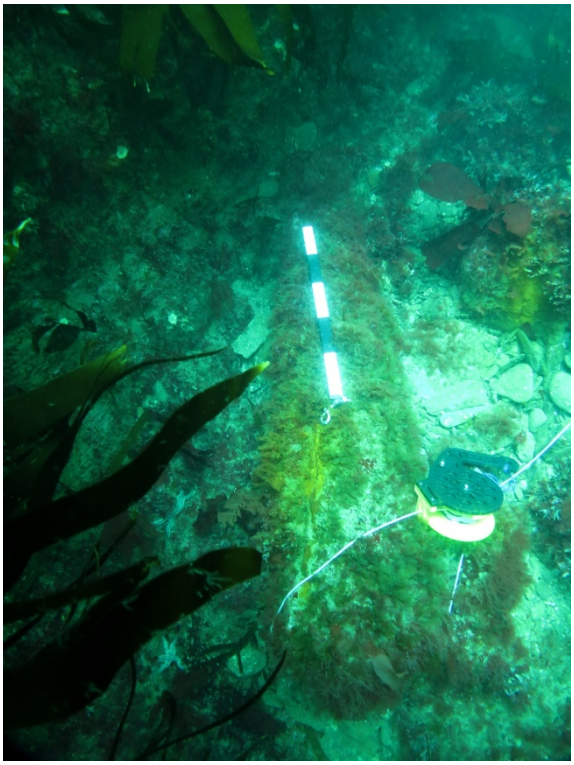


Figure 16: Gun 6

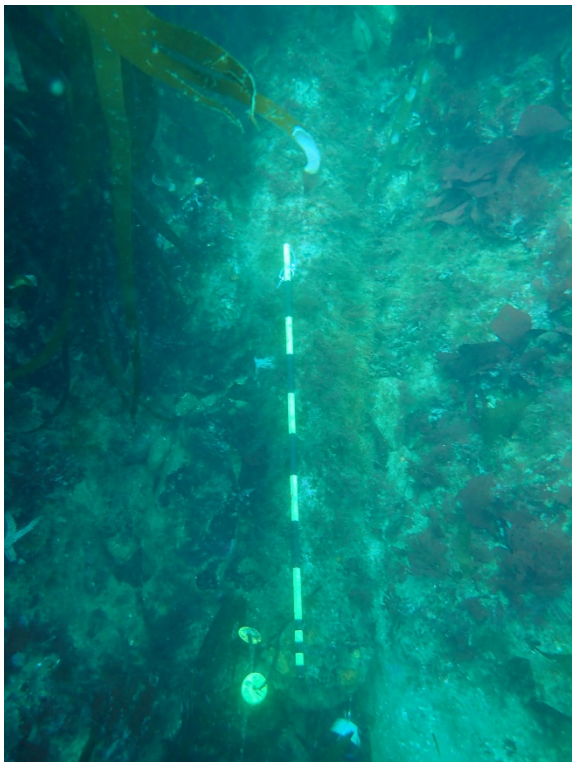


Figure 17: Gun 11

Figure 18: Gun 12

Figure 19: Gun 13

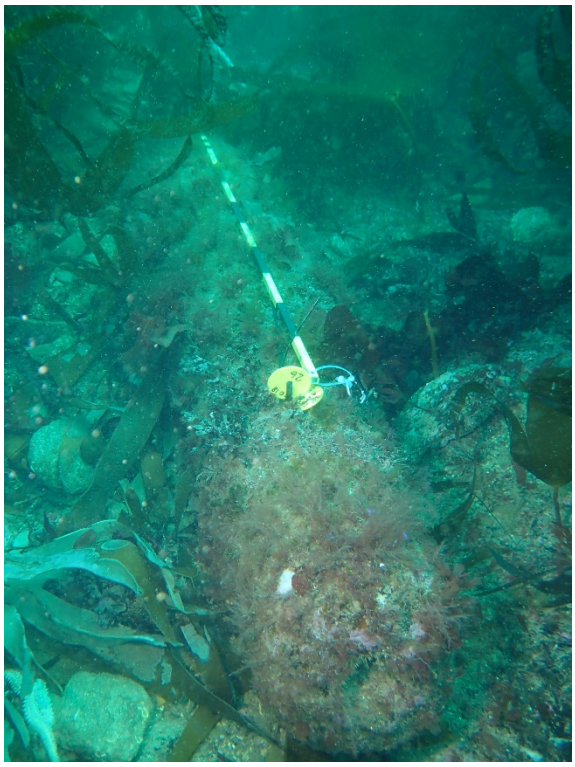


Figure 20: Gun 26

Figure 21: Anchor 5?

Figure 22: Anchor 8

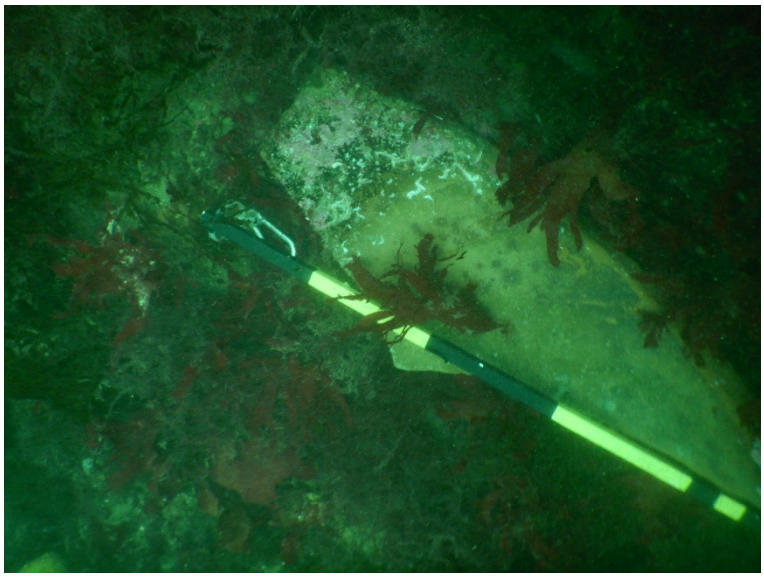


Figure 23: Large pottery shard to southeast of gun 26

Appendix D

Project Team

Role	Name	Qualifications	Affiliation
Project Leader/Diver	Allen Murray	BSAC FCD	Pilgrims SAC, Totnes SAC, WATSAC, SHIPS Project
Records Officer/Diver	Sarah Dashfield	BSAC Advanced	Pilgrims SAC, Totnes SAC, WATSAC
Project Archaeologist	Mallory Hass	PADI Divemaster	Pilgrims SAC, SHIPS Project
Diver	Allan Tudor	BSAC FCD	Totnes SAC
Diver	Carole Tudor	BSAC Advanced	Totnes SAC
Diver	Richard Wood	SAA Dive Leader	Pilgrims SAC, Totnes SAC
Diver	Alec Jacobs	BSAC Advanced	Totnes SAC
Diver	Rosemarie Longfield	BSAC Advanced	Totnes SAC
Diver	Dominic Walley	BSAC Advanced	Totnes SAC
Diver	Katy Weir	PADI Advanced Openwater	
Diver	Sue Syson	BSAC FCD	Pilgrims SAC
Diver	Paul Slemmings	BSAC Advanced	
Diver	Peter Butcher	BSAC Dive Leader	Totnes SAC
Diver	Rod Jones	BSAC Dive Leader	
Diver	Katherine Flood	BDAC Dive Leader	Totnes SAC

Appendix E

Risk Assessment

Mewstone Cannon Risk Assessment

This document should be read by all divers taking part in dives Undertaken as part of the Mewstone Cannon project.

It is the Dive Manager's responsibility to carry out a risk review prior to every dive, based on this generic risk assessment, plus consideration of prevailing conditions. If conditions change such as to be significantly different from those applying at the time the original assessment was undertaken, then the Dive Manager shall reassess the dive plan accordingly.

Hazards should be continuously monitored during any dive or dive related activity. The Dive Manager/boat handler should be prepared to put any contingency plans into place at any point during the dive.

Standard Controls

Divers shall dive within the restrictions of their training and experience and all diving shall be carried out in accordance with BSAC Safe Diving Practices and TSAC Branch Rules.

It is the responsibility of each individual diver to undertake personal risk control measures as befits their level of training and experience and, if appropriate, the Dive Manager/Instructor shall brief the diver/trainee on the risks associated with the dive.

As part of the risk control measures the Dive Manager shall ensure that there is an oxygen kit and first aid kit available on every dive and that personnel on the boat(s) are familiar with the use of the oxygen kit).

A detailed log sheet/slate will be kept during diving operations. The Dive Manager, or Assistant Dive Manager on that boat, where more than one boat is used, shall be advised of any planned decompression schedules.

An approved boat handler must be present in the boat at all times, and only persons having undertaken a recognized boat handling course and subsequently satisfied the Diving Officer of their competence may handle the boat unsupervised. The boat handler shall wear a lifejacket while operating in that role. The engine kill cord should be attached to the boat handler at all times when the boat is underway.

All persons in the boat must be in possession of a buoyancy device and if a dry-suit is to be relied upon in this role the zip must be completely closed before leaving shore.

The A flag should be flown at all times that divers are in the water and should be taken down once all divers have been recovered.

All divers must have completed a medical self-declaration form.

All divers shall carry an alternative (gas) source, i.e. Octopus, Air II, pony or twin-set.

Divers to use SMB/DSMB as appropriate, and at the direction of the boat handler.

Divers should ensure that their equipment is properly maintained and functional.

Divers to carry appropriate surface detection aids and a knife/tool for cutting.

The Dive Manager shall include diver separation procedures in the dive briefing as appropriate.

All divers and boat handlers should be aware of TSAC's diver recall procedure.

All Oxygen kits contain an Incident Procedure Sheet which should be completed to accompany a diver requiring evacuation by the emergency services.

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
Currents	Diver separation underwater	High	Dive Manager to use tide tables where appropriate and brief divers on tidal information. Ensure diver separation procedures are included in briefing and divers to consider use of a buddy line. Contact to be maintained throughout dive. If not diving with SMB, use DSMB for ascent.	Divers to abort dive and return to surface (subject to decompression requirements)
Currents	Diver(s) swept away from marked site or losing contact with boat cover	High	The Mewstone Cannon comprises a series of gulleys which are largely sheltered from the tide once the diver is in them, but the tide can be strong across the rock surface above, and particularly on springs. Dive Manager to use tide tables where appropriate and brief divers on tidal information. Divers to agree dive plan with boat handler/skipper. Where required, set maximum dive times. All divers to carry surface detection aids such as DSMB, torch, strobe, EPIRB, flag, flares, whistle, etc, particularly DSMBs.	Divers to use SMB or DSMB for ascent, DSMBs being sent up on leaving bottom, not from safety stop. Divers to use surface detection aids to attract assistance.
Equipment failure	Serious injury to diver/death	High	Divers to perform a buddy check before entering the water. It is recommended that divers carry-out a bubble check once under the surface. Equipment to be well maintained and regularly serviced.	Divers to abort dive and return to surface. Assistance from buddy as required.
Reduced underwater visibility	Diver separation underwater	High	Ensure diver separation procedures are included in briefing and divers to consider use of a buddy line. Divers to be prepared to abort dive if necessary. All divers to carry detection aids such as torch or strobe. If not diving with SMB, use DSMB for ascent. **NOTE:** Divers should dive in buddy pairs if at all possible. Groups of three should consist of experienced divers who are self-reliant.	Divers to abort dive and return to surface (subject to decompression requirements)

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
Running out of gas	Serious injury to diver/death	High	Dive Manager to record “gas in” and “gas out” on dive slate. Divers to plan gas requirements for their dive and ensure they have adequate gas for that dive. Divers to perform a buddy check before entering the water, including gas levels. Divers to agree a gas reserve at which they will leave the bottom and monitor their buddy’s gas level during the dive. All divers should carry an alternative source (AS), i.e. Octopus, Air II, pony or twin-set.	Diver to use own or buddy’s AS.
Uncontrolled ascent	Serious injury to diver/death	High	Divers should ensure they are properly weighted and capable of making a safe and controlled ascent, and that inflation and dump systems are working correctly. Divers using drysuits to have been trained in their use. Dive Manager to ensure oxygen kit and administrator on boat divers. If training, Instructor to monitor student.	Oxygen kit and trained O2 administrators on site. Diving monitored by boat/shore cover able to provide/direct assistance.
Unfavourable weather	Lost diver/Injury to diver	High	The Mewstone Cannon site is particularly prone to swell and the Dive Manager should plan all dives using latest weather forecast, and to have contingency dive site. Continuously monitor conditions prior to and during dive and abort dive if necessary. If diving from a boat, notify coastguard of position in advance. Skipper to be aware of divers planned times and watch for divers arriving at the surface. Make sure a proper watch is kept at all times. Divers to come up shot line, or use SMB or DSMB for ascent. All divers to carry surface detection aids such as DSMB, torch, strobe, EPIRB, flag, flares, etc, particularly DSMBs. Boat handler to	Dive Manager to cancel diving or change to back-up site. Recall divers if dive in progress. Advise coastguard of change of plan/returning to base.

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
			agree diver recall system with divers prior to entry (e.g. signals via SMB line, engine revving). **NOTE:** Unfavourable weather would include rough sea/swell, poor visibility (fog or rain), low sun preventing boat from seeing divers or onshore wind preventing the pick up of divers.	
Boat propeller	Serious injury to diver or swimmers/death	Medium	Only a competent skipper to operate boat while divers are in the water; a competent skipper is defined as a Diver Cox'n, and experienced Boat handler or a less experienced boat handler under supervision. While on the surface all activities are controlled by the skipper. Divers to ascend up shot line where possible and no ascents to be carried out in open water without an SMB or DSMB unless in an emergency and unavoidable. Divers to look and listen for boat traffic during ascent. Divers to be aware of boat entry and exit procedures.	First Aid to be administered. Dive Manager/boat handler (or other divers) to contact emergency services, as required. Hospitalise, as required.
Cold water	Regulator freezing/freeflow – injury to diver	Medium	Divers to choose appropriate equipment for the environment. Equipment to be well maintained and regularly serviced. Divers should consider the use of environmentally sealed first stages if regularly diving in cold water. If possible keep cylinders out of cold until just before diving. Avoid breathing from regulators on surface prior to dive and do not take regulator out of mouth during dive.	Diver to abort dive if necessary. Use own or buddy's AS if catastrophic loss of gas.
Cold water and/or wind chill	Hypothermia	Medium	Divers to choose appropriate, well fitting exposure protection in good condition, including wind-proof coat to wear on boat if required. Divers to be prepared to exit water early if cold. Divers to monitor	First Aid to be administered. Dive Manager/boat handler (or other divers) to

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
			buddies, and in particular trainees, for early signs of cold. Survival blanket to be kept in boat first aid box.	contact emergency services, as required. Hospitalise, as required.
DCI (DCS and barotrauma)	Serious injury to diver/death	Medium	Divers should agree a dive plan with the Dive Manager before the dive. Divers should avoid aggressive dive profiles and ensure they have sufficient gas for the planned dive. Divers should ensure they are properly weighted and capable of making a safe and controlled ascent, and that inflation and dump systems are working correctly. Divers to remain well hydrated and avoid excessive exercise after diving. If diving on computers, divers to have a contingency plan for computer failure e.g. watch and dive tables. Dive Manager to ensure oxygen kit and administrator on boat dives.	Oxygen kit and trained O2 administrators on site. Dive Manager/boat handler (or other divers) to contact emergency services, as required. Incident Procedure Sheet to be completed for emergency services to accompany diver. Casualty to be referred to recompression facility.
Deteriorating weather	Risk to boat and passengers	Medium	Dive Manager to plan dive using updated weather forecast, and to have contingency dive site. Continuously monitor conditions prior to and during dive and abort dive if necessary.	Dive Manager to cancel diving or change to back-up site. Recall divers if dive in progress. Advise coastguard of change of plan/returning to base.
Diver inattention due to task loading	Diver separation underwater, entanglement of isolated	Medium	Dive Manager to consider likely tasks when determining buddy pairs. Ensure diver separation and recall procedures are included in briefing and	Divers to abort dive and return to surface (subject to

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
	diver		divers to agree behaviour underwater, i.e. different roles to be played by buddies. Divers to be prepared to abort dive if necessary. All divers should carry cutting tool or knife, torch or strobe as appropriate. If not diving with SMB, use DSMB for ascent. NOTE: Divers should dive in buddy pairs if at all possible.	decompression requirements)
Drowning	Serious injury/death of diver or boat passenger	Medium	Divers in drysuits to have zip closed when aboard boat. Non-divers/boat handler to wear life jackets when aboard boat. All divers should carry an alternative source, i.e. Octopus, Air II, pony or twin-set.	First Aid to be administered. Dive Manager/boat handler (or other divers) to contact emergency services, as required. Hospitalise.
Engine failure	Risk to boat and passengers/separation from divers	Medium	Engine to be serviced regularly. Dive Manager to ensure that the boat is carrying sufficient fuel for the planned voyage. Boat to carry toolkit, VHF radio, oars, flares and other emergency equipment.	If unable to repair, seek assistance from other boats in vicinity. If no immediate assistance available, advise coastguard of problem – Mayday if imminent danger to boat/divers. Recall divers if dive in progress/arrange for other boat(s) to pick-up divers if possible.
Fishing line, nets, kelp, and other underwater	Panic, entrapment or entanglement, injury to diver, running out of air,	Medium	The Mewstone Cannon main site comprises narrow gulleys with kelp to the upper rock surfaces, and this kelp is particularly think in summer. Alternative	Assistance from buddy.

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
obstructions	serious injury to diver/death		“target” sites may have fishing line, stray nets or other hazards. Divers should aim to have their equipment streamlined and avoid dangling equipment as far as is possible. Divers must have diving tool/knife for cutting.	
Heart attack	Death	Medium	Divers to complete medical self-declaration/referral to medical referee.	BLS to be instigated. Dive Manager/boat handler (or other divers) to contact emergency services. Hospitalise.
Missed decompression stops	DCI - Serious injury to diver/death	Medium	Divers should agree a dive plan with the Dive Manager before the dive. Divers should ensure they have sufficient gas for the planned decompression schedule, including safety stops if “no decompression” diving. Divers should ensure they are properly weighted and capable of making a safe and controlled ascent, and that inflation and dump systems are working correctly. If diving on computers, divers to have a contingency plan for computer failure e.g. watch and dive tables. Dive Manager to ensure oxygen kit and administrator on boat dives.	Oxygen kit and trained O2 administrators on site. Dive Manager/boat handler (or other divers) to monitor diver(s) for signs of DCI.
Boat launching/recovery	Injury to diver/general public	Low	Dive Manager to ensure that everyone is familiar with procedures for launching and recovery of boats. General public to be kept clear of immediate area during these operations.	First Aid to be administered.

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
Hot weather	Hyperthermia/sunburn	Low	Divers to take precautions against over-heating/sun. Divers to avoid dehydration. Water to be carried on boat.	First Aid to be administered. Dive Manager/boat handler (or other divers) to contact emergency services, as required. Hospitalise, as required.
Other boat traffic/water users in dive site location	Serious injury to diver/death	Low	The Mewstone Cannon site is located in an area much frequented by passing boat traffic. “Alpha” flag to be flown while divers are underwater. Boat cover to monitor other surface traffic while divers are in water. Dive Manager/skipper to avoid placing divers in shipping lanes. Divers to ascend up shot line where possible and no ascents to be carried out in open water without an SMB or DSMB unless in an emergency and unavoidable. Divers to look and listen for boat traffic during ascent. Dive Manager to have contingency dive site and to be prepared to cancel diving or change to back-up site if necessary.	First Aid to be administered. Dive Manager/boat handler (or other divers) to contact emergency services, as required. Hospitalise, as required.
Radio failure	Risk to boat and passengers	Low	Carry hand-held radio or mobile telephone as back-up. Flares to be kept in boat box. If possible, boats to travel in pairs.	In emergency use flares or alternative means of communication to summon assistance from emergency services.
Seasickness	Injury to diver	Low	Divers to take precautions against seasickness, or to avoid diving if they consider that conditions are such	Diver to abort dive if necessary.

Hazard:	Risk of:	Risk Evaluation:	Controls:	Immediate measures to deal with consequences if risk does occur:
			as to make them likely to be ill. Trainees to be made aware of the risk of dehydration and the enhanced risk of DCI if sick. Water to be carried on boat.	
Sharp objects	Injury to diver	Low	Divers to avoid touching jagged/rusty edges of metal on wrecks unless wearing gloves. Dive knives to be kept in sheath unless in use.	First Aid to be administered. Dive Manager/boat handler (or other divers) to contact emergency services, as required. Hospitalise, as required.
Sharp objects	Damage to RIB/injury to diver or boat passenger	Low	Divers to ensure that their equipment does not have exposed jagged edges that are “RIB unfriendly”.	If unable to repair, seek assistance from other boats in vicinity. If no immediate assistance available, advise coastguard of problem – Mayday if imminent danger to boat/divers. Recall divers if dive in progress/arrange for other boat(s) to pick-up divers if possible.