

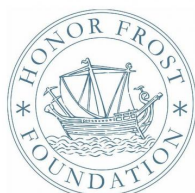
# The Phoenician Shipwreck off Gozo

THE 2020 SEASON

T. GAMBIN



L-Università  
ta' Malta

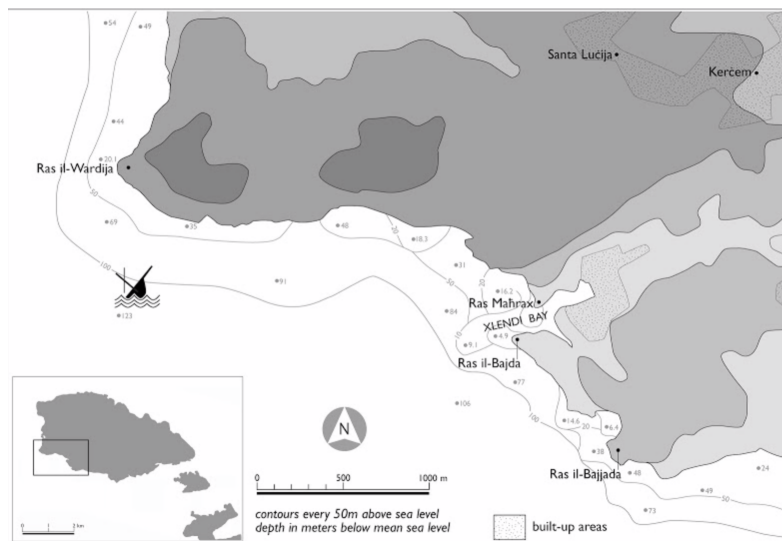


## Preamble

Research on the Phoenician shipwreck has been ongoing since its discovery in 2007. The site was discovered during a systematic side-scan sonar survey of the approaches to Xlendi Bay in Gozo. This survey is part of a long-term broader research project aimed at creating a comprehensive archaeological map of the seabed surrounding the islands of Malta and Gozo. Such a map is a key feature of the strategic approach to managing and protecting the underwater cultural heritage of the Maltese Islands.

## Site Location & Description

Located approximately 900 meters off the south-west coast of Gozo, the shipwreck lies on a relatively flat seabed of coarse sand at a depth of 110 meters (**Fig. 1**). The visible part of the site rises no more than one meter off the seabed. It is possible to discern minor damage caused by traditional bottom-fishing techniques practiced in the past. However, the site is very well preserved and retains a distinguishable outline.



**Figure 1:** Map of the southeast coast of Gozo indicating the approximate location of the Phoenician wreck site marked by the ship symbol (M. Anastasi)

The dimensions of the shipwreck are 12 meters long, by 5 meters wide, with a depth of 1.8 meters of archaeology buried under the sediments. The latter dimension was acquired during a sub-bottom profiler survey.

In 2014, a Franco-Maltese team worked on the site using state-of-the-art technologies. The results of this project were the creation of a high-resolution 3D image of the shipwreck and the recovery of four objects. Since 2016, an international team of technical divers, led by the present author, has continued to conduct scientific research on the site with systematic recovery of objects conducted in 2017, the excavation by a team of divers executed in 2018 and 2019.

### **Past Work on the Site**

2007-2010: Various remote sensing surveys undertaken by high-resolution side-scan sonar, sub-bottom profiler and remotely operated vehicle (ROV).

2014: Site survey and object recovery through the use of a manned submersible.

2016: Site survey and object recovery by diving archaeologists.

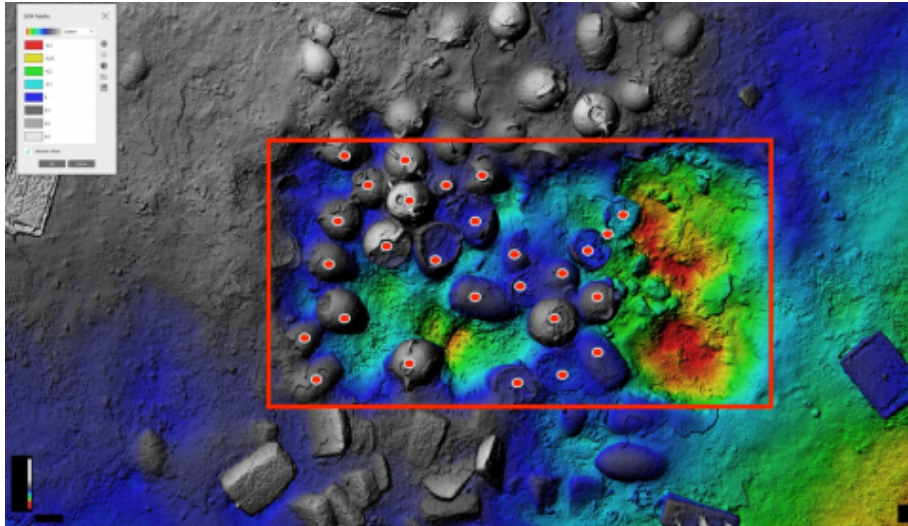
2017: Preparation of site for subsequent seasons, site survey, samples and objects recovery.

2018: Start of excavation of a 4x2 meter test trench.

2019: Continuation of excavation of a 4x2 meter test trench

### **Aim of the 2020 Project**

1. To continue surveying and recording the entire site and the excavation progress through the use of advanced 3D photogrammetry.
2. To recover artefacts earmarked for recovery that were cleared of silt in 2019 (**Fig. 2**)
3. To continue excavation of the 4 x 2-meter test trench started in 2018, located at one extremity of the site.
4. To set up two hydraulic submersible pumps with new steel dredges to assist in excavation.
5. To continue post excavation inter-disciplinary studies in order to better understand the broader archaeological significance of the site.
6. To raise public awareness, locally and internationally, of the archaeological significance of the Phoenician shipwreck.



**Figure 2:** Grid where excavation was terminated in 2019. Objects marked were earmarked for recovery in 2020.

### **Fieldwork Procedures and Methods**

The overall aims of the project were clearly laid out in the Project Manual and the Project Diving Plan. These documents were disseminated to all participants before the commencement of the project. An overview of planned activities was presented in the initial briefing sessions.

For the duration of the project, a brief was delivered by the Project Director (PD) and Dive Safety Officer (DSO) the night before each working day (**fig. 3**). Objectives and roles were allocated, feedback taken into account and observations shared to consolidate knowledge of the site and facilitate the next day's work. Each main diving team member was allocated a specific task including excavation, 3D modelling or video imagery, or in a safety role. The DSO covered the dive plan, procedures and safety elements. Dive teams would subsequently meet to discuss the specificities of their role in order to fulfill their role efficiently. The plan was posted in a shared group message for reference.



**Figure 2:** Briefings by Project Director and Dive Officer at base (C. Gauci).

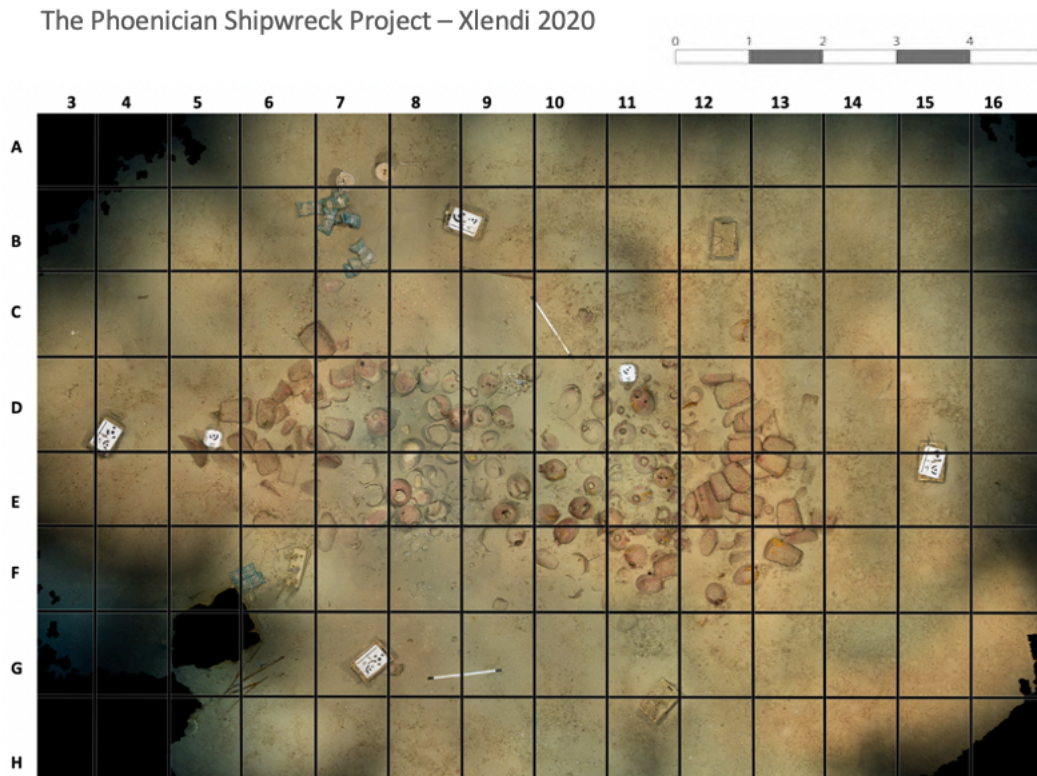
Due to Covid-19, most team members participated for the majority of the project. Divers arriving at different stages of the project were briefed individually.

Prior to the commencement of diving operations in 2020, a number of tasks were carried out. These tasks were accomplished from the *RV Hercules* that was made available by the RPM Foundation and included the following:

1. Partial removal of the layer of Geotextile.
2. Lowering of a mooring block to the seabed for a second dredge system.

The first diving task was to connect the main shot line to the mooring block that was positioned close to the site in 2017. This line provides the quickest and safest route for the divers to move to and from the wreck and is essential due to the limited bottom. Subsequent preparatory dives included the placing of scales needed for photogrammetric recording and the complete removal of the geotextile.

The excavation of the test trench was approached systematically by overlaying a 4x 2 m grid with 1 x 1 m subunits. This created points of reference for briefing and ease of location in the tight time constraints on site. The quadrants excavated were 7D to 7G and 8D to 8G (**Fig. 3**).



**Figure 3.** Site with grid reference (M. Kassulke).

Following the successful use of the technique during the 2018 and 2019 excavations, the excavation team used a hydraulic-powered submersible pump with a hydraulic machine housed on the bow deck of the boat.

When possible, excavations were conducted by teams of three divers. Two divers operated a dredge each in a 1x1 m subunits with the other acting as safety diver. The hand-fanning technique was used to dislodge sediments although the lower levels of the archaeological deposit necessitated the use of trowels. Systematic excavation ensured progress in a controlled manner with the gradual removal of sediments across all eight subunits. Sherds and other archaeological materials were placed in mesh bags that were marked and designated for each of the grid's subunits. The ROV was

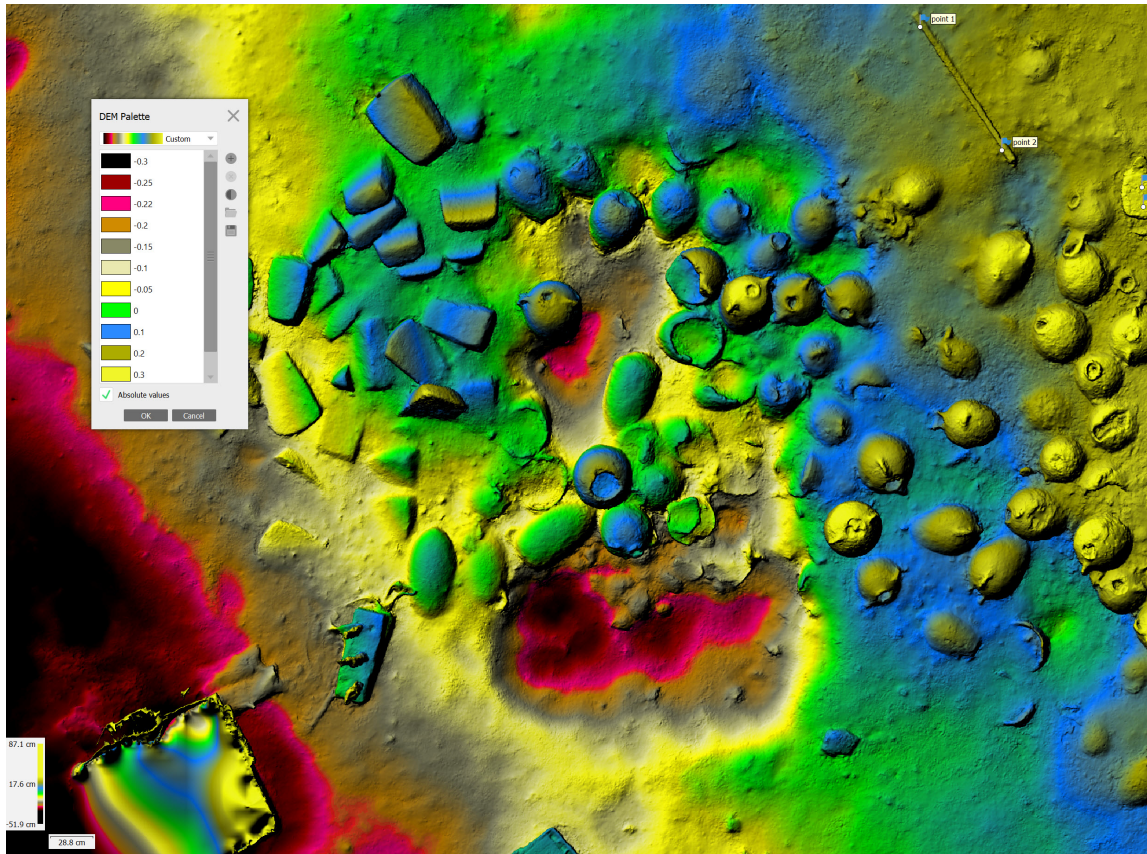
deployed during diving operations. The ROV provided a line of communication with the surface and footage of how the excavation progressed on that particular day.

The safety divers were responsible for recovering the shot line, deploying the decompression trapeze, assisting divers into the water, and relieving the rebreather divers from bailouts, cameras, and artefacts brought up by the deep divers. They also assisted with setting the flotation drums on the shot line as well as the hydraulic hoses.

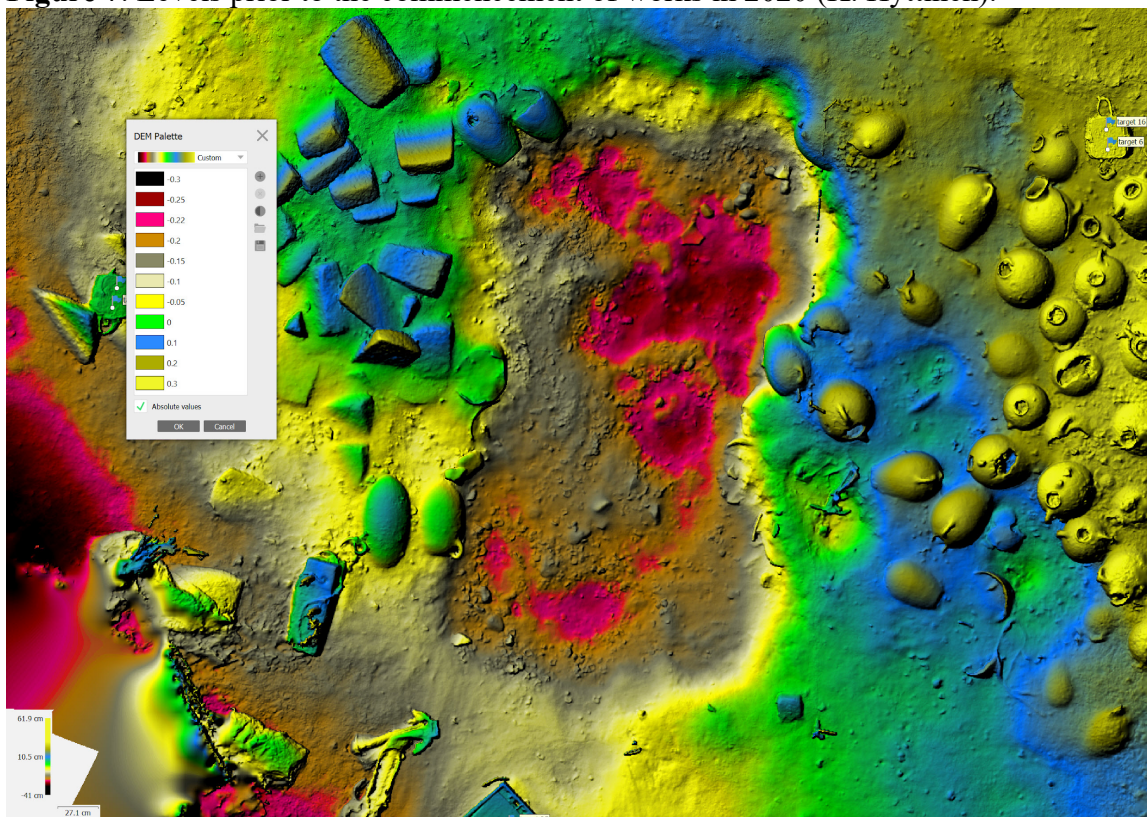


**Fig 6.** Divers being observed from the surface with the ROV (C. Gauci).

The first dive of the day was dedicated to data acquisition with the 3D Team recording the trench as left at the end of the previous day's operations. Progress was recorded on a daily basis by comparing dense clouds produced from the 3D photogrammetry models, orthophotos and DEMs (**Figs. 7 and 8**). All data, including measurements, were inputted and stored into the Site Recorder database started in 2018. Before its removal, the grid's position was marked by iron rods so as to facilitate its re-installation in 2021. A final 3D survey was conducted on the last day of operations prior to covering the excavated area with two layers of geotextile held down by sandbags to preserve the site in-situ.



**Figure 7.** Levels prior to the commencement of works in 2020 (K. Hyttinen).



**Figure 8.** DEM showing levels in trench after conclusion of 2020 season (K. Hyttinen).



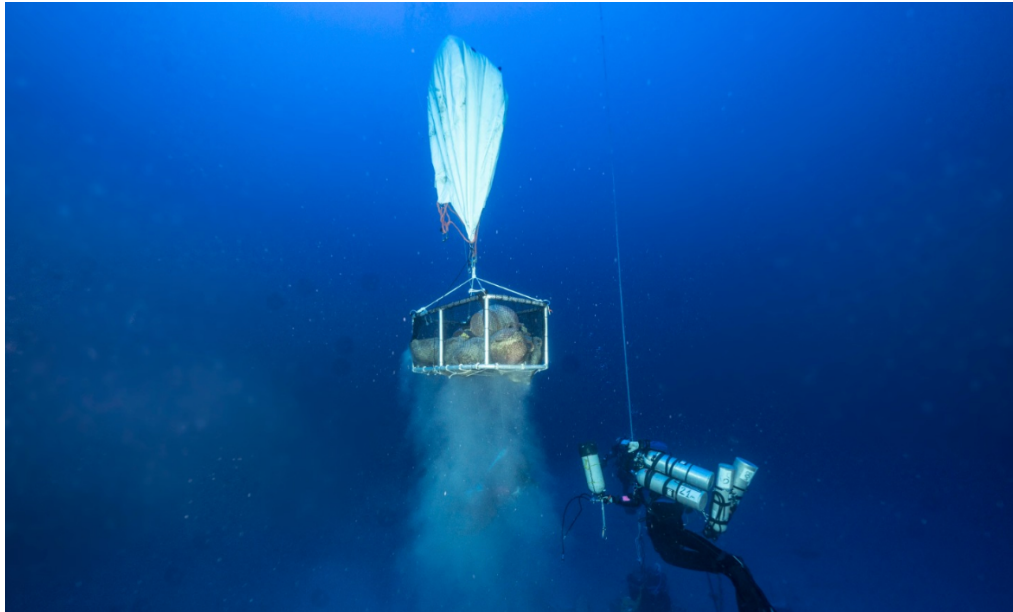
Small objects such as ceramic shards and organic material including wood fragments and molluscs which came loose during excavation were put in a mesh bag. This was either clipped to the diver's equipment and passed to the safety diver during decompression or placed in the lifting basket.

The lifting basket was used to recover large objects including urns and amphoras (**figs. 9 and 10**). The basket was modified after the weight of the objects caused the floor of the basket to sag, making it difficult to manoeuvre the basket on board. It was subsequently consolidated with rubber matting.

The divers would roll or lift the assigned objects into the basket, then indicate to surface support that the basket would break the surface using a pink SMB. Once the lifting bag broke the surface, a free diver secured the basket to the winch line while keeping clear of the lifting bags. The basket was raised to the lift, the lift bags emptied, the basket brought onboard, and the objects moved to secure positions onboard.



**Figure 9:** Basket loaded with amphora (D. Gration)



**Figure 10:** Lift bag deployed (D. Gratton)

Once the artefacts were back at base, preliminary photographs were taken and the process of creating scans began (**figs. 11 and 12**). These scans will ultimately be used in archives and for outreach projects, including the Virtual Museum and Phoenician Wreck Site.

The artefacts were transferred to the University of Malta to continue the process of desalination, as well as sieving the contents of the containers in acknowledgment that the sediment contains important archaeological and environmental information (**fig. 13**)

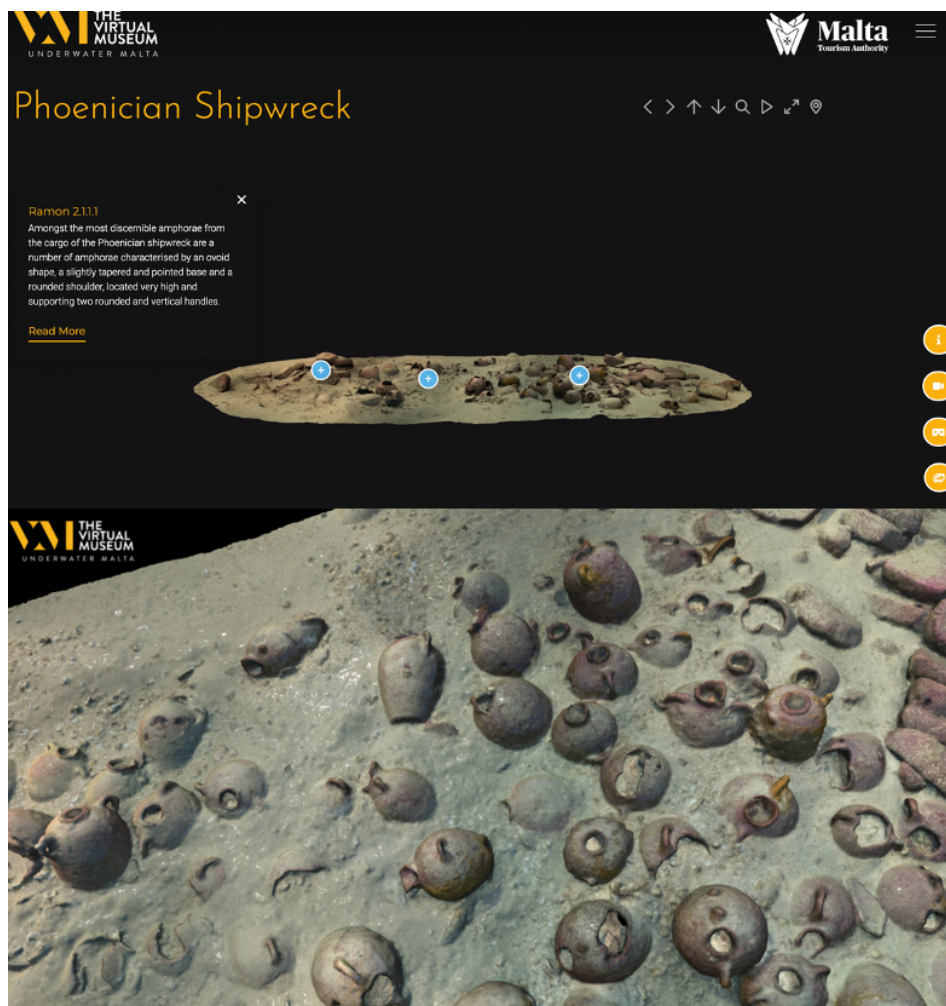


**Figures 11 and 12:** Preliminary scanning of a jug and urn (C. Gauci)



**Figure 13:** Sieving contents of amphora (T. Gambin).

Due to Covid-19, aspects of public outreach strategy had to be adapted. The Open Day at Xlendi Bay organized in collaboration with the Munxar Local Council, as well as the stall at Science in the City showcasing amphorae and 3D models of the wreck, were both cancelled. However, the increased focus on online education and outreach over the past years proved timely and invaluable. The Phoenician Wreck was one of the first 10 sites included on the launch of the Virtual Museum- Underwater Malta (figs. 14 and 15). The aim of the online platform is to use 3D, Virtual Reality, video and photography to provide access to and share Malta's unique underwater cultural heritage with all members of the public. The Phoenician Shipwreck website was launched in Spring of 2020 and is dedicated specifically to news and progress about the site. This has also seen significant interest (Appendix D).



**Figure 14 and 15:** Screenshots from the Phoenician Shipwreck interactive page of the Virtual Museum.

### Artefacts Recovered

The objects raised are of a mixed typology and material makeup.

|  |
|--|
| C06<br>Recovered 06/09/2020<br>Round-mouthed jug with globular body, flat base and cylindrical neck with slightly flared rim. Similar to neck and shoulder.  |
| C05<br>Recovered 29/08/2020<br>Incomplete fragments of pot with a shallow rounded body and wide neck with slightly flared rim.   |
| C08<br>Recovered 27/06/2020<br>Pot with round body, flat base and wide neck with incomplete slightly flared rim. Rounded lugs at   |
| C09<br>Recovered 06/09/2020<br>Pot with wide round body, flat base and wide neck and incomplete slightly flared rim. Rounded lugs  |
| C10<br>Recovered 31/08/2020<br>Round-mouthed jug with globular body and a high cylindrical neck and slightly flared rim. Protruding<br>Single vertical round handle attached to neck and shoulder. |
| C11<br>Recovered 10/09/2020<br>Fragments of incomplete round-mouthed jug with flat base and wide cylindrical neck. Single rounded<br>and shoulder.   |

**Table 2:** Objects recovered

|  |
|--|
| A001<br>Recovered 18/08/2020<br>Amphora with cracked body temporarily preserved using cable ties. One remaining rounded<br>handle attached to shoulder, and incomplete neck. |
| A004<br>Recovered 02/09/2020<br>Amphora fragments with rounded vertical handles attached to shoulder.  |
| A005<br>Recovered 30/08/2020<br>Amphora fragments with large flat base piece and one complete rounded handle.  |
| A006<br>Recovered 29/08/2020<br>Amphora with two rounded handles attached to the shoulder and incomplete neck.   |
| A007<br>Recovered 29/08/2020<br>Fragments of amphora including flat base and side, and sediment retained for analysis.   |
| A008<br>Recovered 29/08/2020<br>Fragments of incomplete amphora, one complete rounded handle.  |
| A009<br>Recovered 29/08/2020<br>Amphora with two vertical rounded handles attached to shoulder with broken neck and graffiti<br>near mouth.                                  |
| A011<br>Recovered 29/08/2020<br>Amphora with incomplete neck and vertical handles attached to body.  |

|  |
|--|
| A017<br>Recovered 02/09/2020<br>Amphora with indents from where handles were attached and broken neck with wide hole.  |
| A018<br>Recovered 29/08/2020<br>Amphora with two small handle attached to the body and a large hole in the side. Incomplete elevated cylindrical neck with slightly flared rim.                  |
| A020<br>Recovered 31/08/2020<br>Amphora fragments with flat base piece and sides.  |
| A022<br>Incomplete amphora   |
| A23<br>One side of amphora with handle and colour variation.   |
| A024<br>Recovered 02/09/2020<br>Amphora with two incomplete handles and elevated cylindrical, slightly flared neck.  |
| A026<br>Amphora fragments  |
| A027<br>Recovered 02/09/2020<br>Amphora with two vertical handles attached to body with a wide opening at the neck.  |
| A028<br>Recovered 02/09/2020<br>Amphora with one remaining vertical handle and an elevated, rounded, and slightly flared neck.   |
| A029<br>Recovered 02/09/2020<br>Amphora with one remaining vertical handle attached to body. Possible suggestions of an elevated, slightly flared neck.  |
| A030<br>Recovered 29/08/2020<br>Amphora with two vertical handles and sprouting neck with irregular holes in the side.   |
| A031<br>Recovered 29/08/2020<br>Amphora  |
| A036<br>Recovered 29/08/2020<br>Urn with two horizontal handles and incomplete elevated flared neck.   |
| A042<br>Recovered 29/08/2020<br>Amphora with two handles attached to the shoulder and incomplete elevated neck.  |
| A097<br>Recovered 29/08/2020<br>Amphora with two handles attached to the shoulder, wide mouth and missing neck.  |
| A103, A104<br>Recovered 02/09/2020<br>Complete amphora with rounded rim and vertical handles attached to shoulder.<br><br>Side fragment of amphora of similar typology with one complete handle. |
| A110<br>Recovered 29/08/2020<br>Amphora with two vertical handles attached to shoulder, elevated slightly flared neck and original moulded seal.   |
| A111<br>Incomplete amphora fragments   |
| A108, A029<br>Recovered 02/09/2020   |

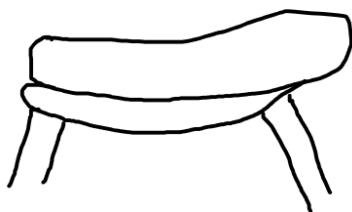
|  |
|--|
| Amphora with one remaining rounded handle, incomplete elevated neck and hole on one side from mouth. |
| Amphora fragment with rounded handle.  |
| A112<br>Recovered 02/09/2020<br>Amphora fragments  |
| A113<br>Recovered 02/09/2020<br>Incomplete amphora fragments   |
| A114<br>Incomplete amphora fragments including two rounded handles.                                  |
| A116<br>Amphora fragments  |
| Mixed 2020<br>Recovered 29/08/2020 – 06/09/2020  |

**Table 3:** Amphoras recovered

The recovery of two amphoras with graffiti etchings is a unique find. A009 was earmarked for recovery in 2019 when the graffiti was seen on the 3D Photogrammetry model in the post-excavation analysis and the amphora was raised successfully. Possible interpretations include the entranceway to a temple, animal, manufacturer or merchants stamp (**figs. 16 and 17**)



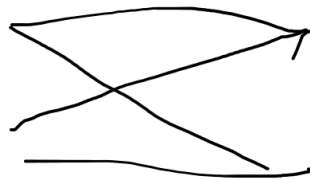
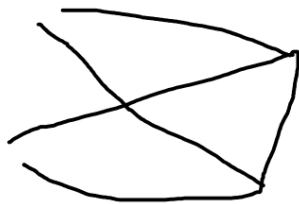
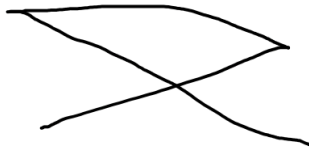
**Figure 16 and 17):** Graffito on A009, a rough line drawing (M. Kassulke)



A06 was raised and a graffito discovered. Possible interpretations include a manufacturer or merchants stamp (figs 18 and 19)



**Figure 18 and 19:** Graffito on A06, rough line drawings showing various interpretations (M. Kassulke)



Organic artefacts were also recovered. Pieces of wood that came loose during excavation that may be hull fragments were collected. Scientific testing will include Carbon 14 dating and determining the species. A sample of molluscs were collected from each amphora. Layers of sediment in the amphoras represent temporal layers, and the properties of the molluscs in the layer can determine environmental conditions in the centuries since the sinking. One amphora in particular contained numerous Murex shells which are of special interest as these were the principal ingredient for the Tyrian purple dye that was a prized Phoenician export.



## **Diving Appraisal**

All updated diving and emergency procedures as well as diving logistics and description of the environment were handed out to participants in a Diving Project Plan document before the start of the 2020 season. Due to the extreme depth of the shipwreck, dives are physically and mentally taxing and require divers to be not only experienced but also highly disciplined. All feasible safety precautions were in place so as to ensure diver safety. Individual diver checks were executed on a daily basis by a member of the surface support team. Further back-up cylinders were carried by divers in case their rebreathers failed.

The Heritage Malta RIB acted as the fast boat and was placed on standby and remained close to the decompression trapeze and shot line. The role of the fast boat was to keep the area clear of boat traffic, to act as backup for emergency evacuation procedures, to deploy the emergency bailout line if needed, as well as transporting divers quickly to shore in medical emergencies. VHF contact was maintained between the two vessels.

Furthermore, the project dive protocol covered emergency procedures for a variety of situations. Staff members from the hyperbaric chambers of Gozo and Malta were briefed and informed before diving operations commenced. This meant that they were aware of the project's operations and team dive profiles, and were also on standby for any emergency that may have occurred.

New safety measures were implemented under the supervision of team medic Dr Chris Gauci who used the O'Dive Doppler, which is a vascular microbubbles sensor (ultrasound Doppler technology). Information recovered from divers' computers and from the doppler were uploaded to a server (in France) that analysed personal measurements and provided information that could be used for improved dive safety.

## **Project Outcomes**

The main objectives of the season were the recovery of artefacts and the continuation of archaeological excavations of the test trench started in 2018. Lessons learned over the past diving seasons were taken into consideration and procedures were adapted to

ensure that the project was executed as efficiently and safely as possible. The objectives reached include the following achievements:

- 1) Photogrammetric surveys of the excavation trench were accomplished daily. The data was processed on the same day as data acquisition. In this way, 3D models, orthophotos and DEMs were used for daily planning and refinement of excavation strategies.
- 2) Digital records of excavation depths were produced to millimetric accuracy.
- 3) Lower levels of site were reached with the ballast layer and some timbers being observed.
- 4) Archaeological objects from the 4x2m grid were recovered.
- 5) Multiple fragments of loose wood were discovered in the lower levels of the sediment. Recovered samples will be sent to a laboratory in France for testing.
- 6) The site was covered with two layers of geo-textile as part of the preservation strategy.
- 7) The participation of Maritime Archaeology students in support roles.

### **Concluding Remarks**

Despite the challenges of conducting a project during the Covid-19 pandemic, the fieldwork phases of the 2020 season of the Phoenician Shipwreck Project have been completed and objectives achieved. A number of diverse ceramic artefacts and organic materials were recovered that may provide insights into important questions such as trade networks and ship construction. The ongoing research produced by this project brings forth more evidence and results which, through publications and outreach, will help disseminate the project to academic communities and the general public alike.

Lessons learned, and experience garnered in 2018-2019 served to make the 2020 season more efficient. The excavation area was set up quicker, and the excavation days more numerous and extended over a month rather than 3 weeks. Artefacts were raised efficiently and safely, a significant amount of sediment of sediment was systematically removed from around the main archaeological deposit. The plan for 2021 is to continue the removal of sediments so as to expose and record the ballast in-situ, and subsequently expose and record the timbers in situ.



## **Appendix A Collaborative Institutions**

University of Malta

Heritage Malta

Superintendence of Cultural Heritage

Universitaire Aix Marseille

Centre national de la recherche scientifique (CNRS) - Marseille

University of Urbino

University of Tuibingen

Mediterranean Institute of Biodiversity and Marine and Continental Ecology (IMBE)

## Appendix B

### 2020 Project Participants

Project Director: T. Gambin

Co-Director (archaeology): J. C. Sourisseau

Dive Safety Officer: D. Gration

Medical Officer (and support diver): Dr C. Gauci

3D Team: J. Wood and K. Hyttinen

Videographer: GM. Iaria

Rebreather Divers: J. Smith; N. Taylor; K. Haegens; P. Lammi; PJ Prinsolo; C. Vella;

Support Divers: M. Sausmekat; D. Kovacevic and K. Goovaerts

Surface Support: M. Vella; J. Mifsud; M. Kassulke and T. Gambin

Boat Skippers: K. Vella & K. Azzopardi

## Appendix C

### Outreach related to the Phoenician Shipwreck

#### **September 2019:**

Open Day at Xlendi Bay organized in collaboration with the Munxar Local Council (Gozo)  
Science in the City – Amphorae & 3D of the Phoenician Wreck (Valletta)

#### **October 2019:**

Talk at Rotary Club International (Corinthia San Gorg Hotel, Malta)

#### **Nov 2019:**

Talk to Calypso Dive Club (Sliema, Malta)

#### **December 2019:**

Annual lecture to the Honor Frost Foundation (The British Academy, London)

#### **January 2020:**

Talk delivered to residents of Arlington on the Phoenician Shipwreck (Arlington Town Hall, Texas, USA)

Talk delivered to the American Institute of Archaeology (Dallas-Fort Worth Chapter on the Phoenician Shipwreck, Southern Methodist University, Dallas, Texas, USA,

Talk delivered to students and faculty Texas A&M (College Station, Texas, USA)

**May 2020:**

Paper delivered for the Conessioni mediterranee, una prospettiva da Tas-Silġ organized by the Istituto Culturale Italiano. (Virtual seminar due to COVID 19)

**October 2020:**

Talk delivered for the Archaeological Society Malta (Virtual seminar due to COVID 19)

## Appendix D

### 2019 Dive Statistics

Over a 26-day period a total of 136 dives to 110m were completed.

Time in water:

24,480 minutes (408 hours). Less than 10% of this total were spent at 110m.

Open circuit divers completed over . 120 dives to ensure the safety of the deep divers during decompression stops. These dives were also essential for the smooth running of the operations.

| Phoenician Expedition September 2020 |           |              |                |               |                |
|--------------------------------------|-----------|--------------|----------------|---------------|----------------|
| Gases Used                           |           |              |                |               |                |
| Gas Mix                              | Tank Size | No. of Fills | Litres of O2   | Litres of He  | Litres of Air  |
| O2                                   | 3L        | 154          | 101,640        |               |                |
| 8/70                                 | 3L        | 156          | 8,238          | 66,924        | 27,798         |
| 13/60                                | 11.1L     | 9            | 2,858          | 13,188        | 5,933          |
| 18/45                                | 11.1L     | 11           | 4,836          | 12,088        | 9,939          |
| 50/20                                | 11.1L     | 10.25        | 12,515         | 5,006         | 7,509          |
| Air                                  | 0.5       | 148          |                |               | 16,280         |
| Air                                  | 15L       | 96           |                |               | 316,800        |
| O2                                   | 5.7L      | 13           | 67,579         |               |                |
| <b>Total</b>                         |           |              | <b>197,666</b> | <b>97,206</b> | <b>384,259</b> |

## Appendix E

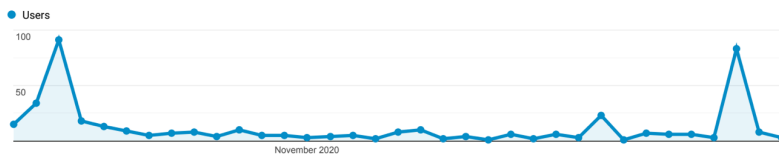
### Phoenician Shipwreck Website Traffic Statistics in an Average Month

<https://phoenicianshipwreck.org/>





Overview

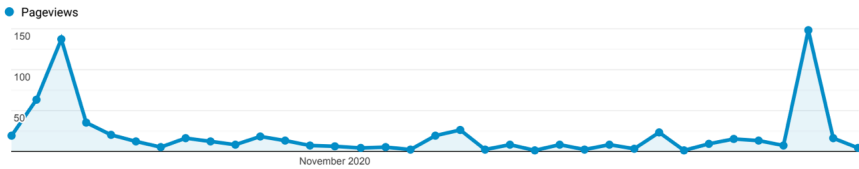


|                                     |                       |                         |
|-------------------------------------|-----------------------|-------------------------|
| Users<br>376                        | New Users<br>376      | Sessions<br>450         |
| Number of Sessions per User<br>1.20 | Pageviews<br>695      | Pages / Session<br>1.54 |
| Avg. Session Duration<br>00:01:22   | Bounce Rate<br>72.44% |                         |



| Country           | Users | % Users |
|-------------------|-------|---------|
| 1. Malta          | 96    | 25.46%  |
| 2. United States  | 96    | 25.46%  |
| 3. United Kingdom | 40    | 10.61%  |
| 4. Canada         | 26    | 6.90%   |
| 5. Italy          | 13    | 3.45%   |
| 6. Australia      | 9     | 2.39%   |
| 7. Germany        | 8     | 2.12%   |
| 8. South Africa   | 8     | 2.12%   |
| 9. Spain          | 7     | 1.86%   |
| 10. China         | 6     | 1.59%   |

Overview



|                  |                         |                               |                       |                  |
|------------------|-------------------------|-------------------------------|-----------------------|------------------|
| Pageviews<br>695 | Unique Pageviews<br>613 | Avg. Time on Page<br>00:02:31 | Bounce Rate<br>72.44% | % Exit<br>64.75% |
|------------------|-------------------------|-------------------------------|-----------------------|------------------|

| Page   | Pageviews | % Pageviews |
|--|-----------|-------------|
| 1. /   | 310       | 44.60%      |
| 2. /gallery/   | 76        | 10.94%      |
| 3. /exploring-the-phoenician-shipwreck-off-xlendi-goza/  | 49        | 7.05%       |
| 4. /the-team/  | 43        | 6.19%       |
| 5. /seasons/   | 34        | 4.89%       |
| 6. /in-the-press/  | 10        | 1.44%       |
| 7. /contact-us/  | 9         | 1.29%       |
| 8. /this-ancient-underwater-discovery-is-being-exhibited-for-the-first-time-ever-in-goza-cittadella/ | 9         | 1.29%       |
| 9. /?fbclid=IwAR0ULHYQGfEjsU0wic93aCN_w4Q5xb6RpcOayMTUGAr7eDcXVFgjq9FyAo                             | 6         | 0.86%       |
| 10. /partners/   | 6         | 0.86%       |

## Acknowledgements

This project is made possible through the generous support of the University of Malta, Ministry for Gozo, Malta Tourism Authority, Malta International Airport, Honor Frost Foundation and Heritage Malta. This report was put together with the assistance of M. Kassulke.

## Dedication

The 2020 season was dedicated to the memory of Chrstine Gauci, a volunteer on our team in 2019, who tragically lost her life in January 2020. The wasp displayed on the rear of this year's project t-shirt reflects her family nickname.

