

# Korcula 2011 Report

## Project Funded by: British Sub-Aqua Jubilee Trust

### Summary

In 2009 substantial pottery remains were found in a number of locations following on from previous investigations. One of the richest areas was on the southern side of Korcula at U. Przina. The remains at U. Prizna consisted of some large body sherds from amphorae wedged under rocks, as well as a scattering of neck and rim sherds. There was evidence of ancient settlement on the northern shore of the bay and a local tradition that there had been a small anchorage in the bay. It is possible that the material on the seafloor was the remains of cargoes and personal amphorae lost when the vessels missed the entrance to shelter or to discharge cargo.

The main aim of this project was to locate ceramic distributions, map them and identify, where possible, the types of ware present. For this project the word ceramics should be understood as 'articles of clay' (Collins English Dictionary 2006: 278). From study of the assemblages it may be possible to relate the remains to known trading behaviour. It was clearly understood by all from the beginning that this was to be a non-disturbance survey only and nothing was to be moved, only photographed and measured.

On arrival in Korcula it became apparent that the original site on the southern side of the island could not be dived as the wind direction made it impossible to get round the headland into the bay. Instead sites were chosen on the more protected sites of Lumbarda and the Plić Lucnjak (Fig. 1).

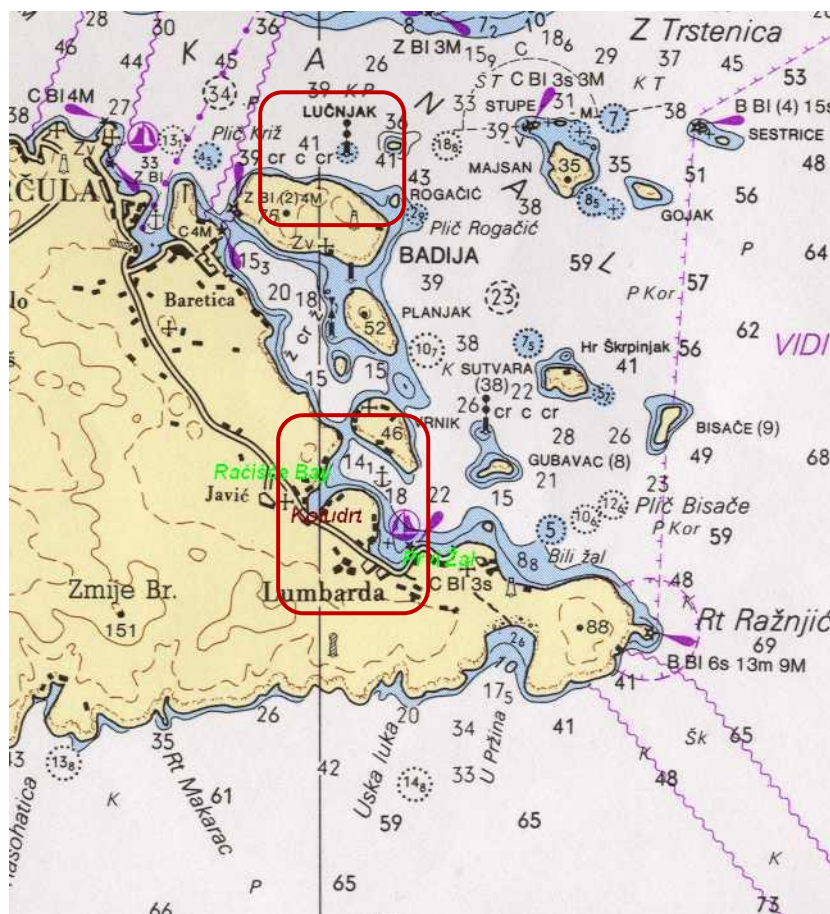


Figure 1. Map of Korcula showing areas dived as part of the project.

The surveys done on and around Lumbarda demonstrated that the sea grass could cover some important remains from early settlement. It would have been more useful to have begun the survey closer to the settlement, at the western end but as a suitable area for establishing training in basic survey techniques it was very useful.

A dive done on what became known as *Steve's Patch* on the western side of Vrink demonstrated firstly that the team members could find pottery in the sea grass and secondly that the site had been subject to substantial disturbance by fishing vessels and boats' anchors during the normal course of every day navigation over many hundreds of years. Again, although the sherds were all out of context it was useful as a training exercise because it was shallow and allowed dsmb deployment as a tool to help fix positions of the scatters using the support RHIB's satnav. It also helped to establish recognition of the target archaeology for the team (Fig. 2).

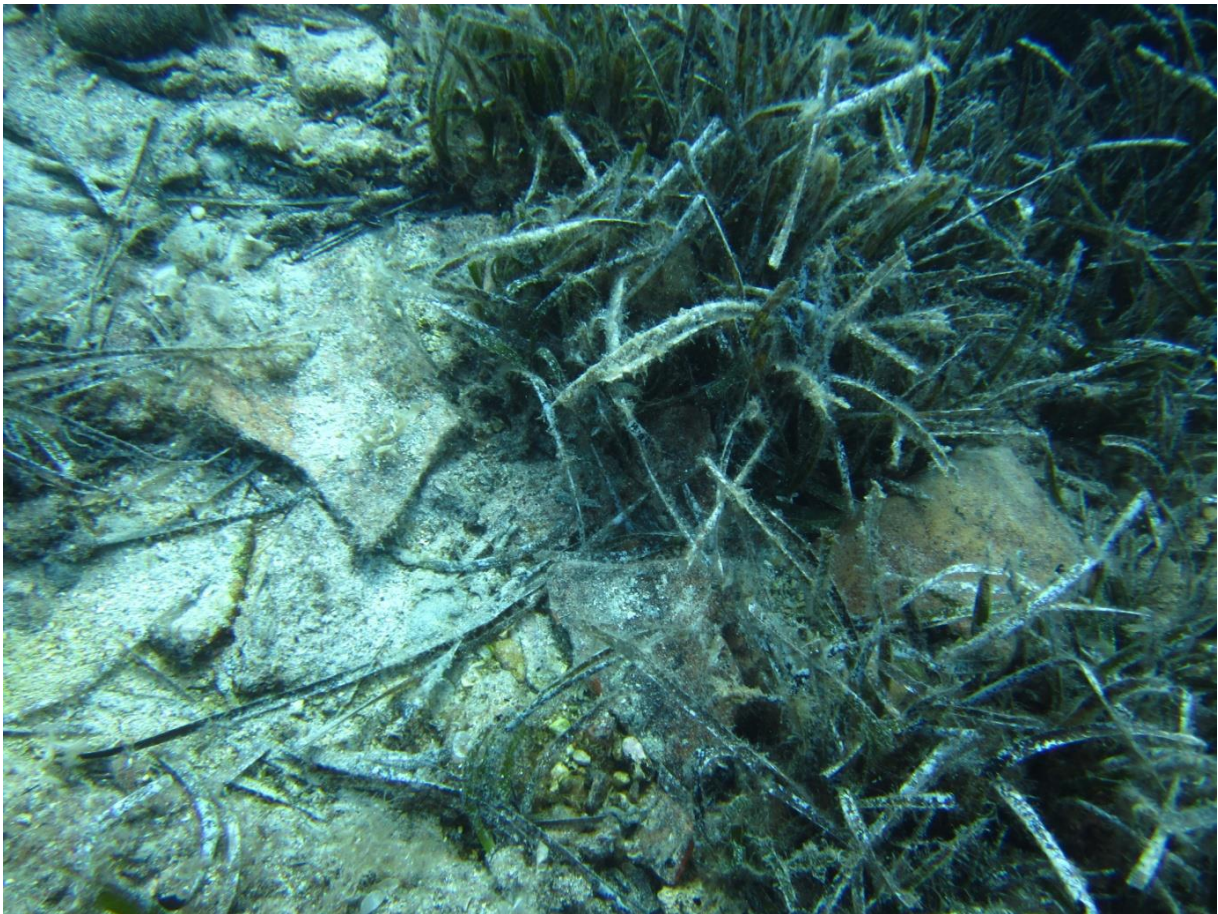


Figure 2. Potsherds in sea grass. Photograph Roger Wallace

Following the training exercise the team looked at an isolated danger buoy (IDB). In the UK the presence of an IDB would indicate the possibility of wrecking events that would repay a reconnaissance dive. Consequently we dived on the mound under the IDB and found substantial scatters of pottery, mainly body sherds, but some necks, shoulders, handles and bases (Fig. 3). It was decided to focus on this site.

This decision was validated by the presence of a large scatter of amphora fragments all over the mound, and most noticeably on the western edge of the obstruction.



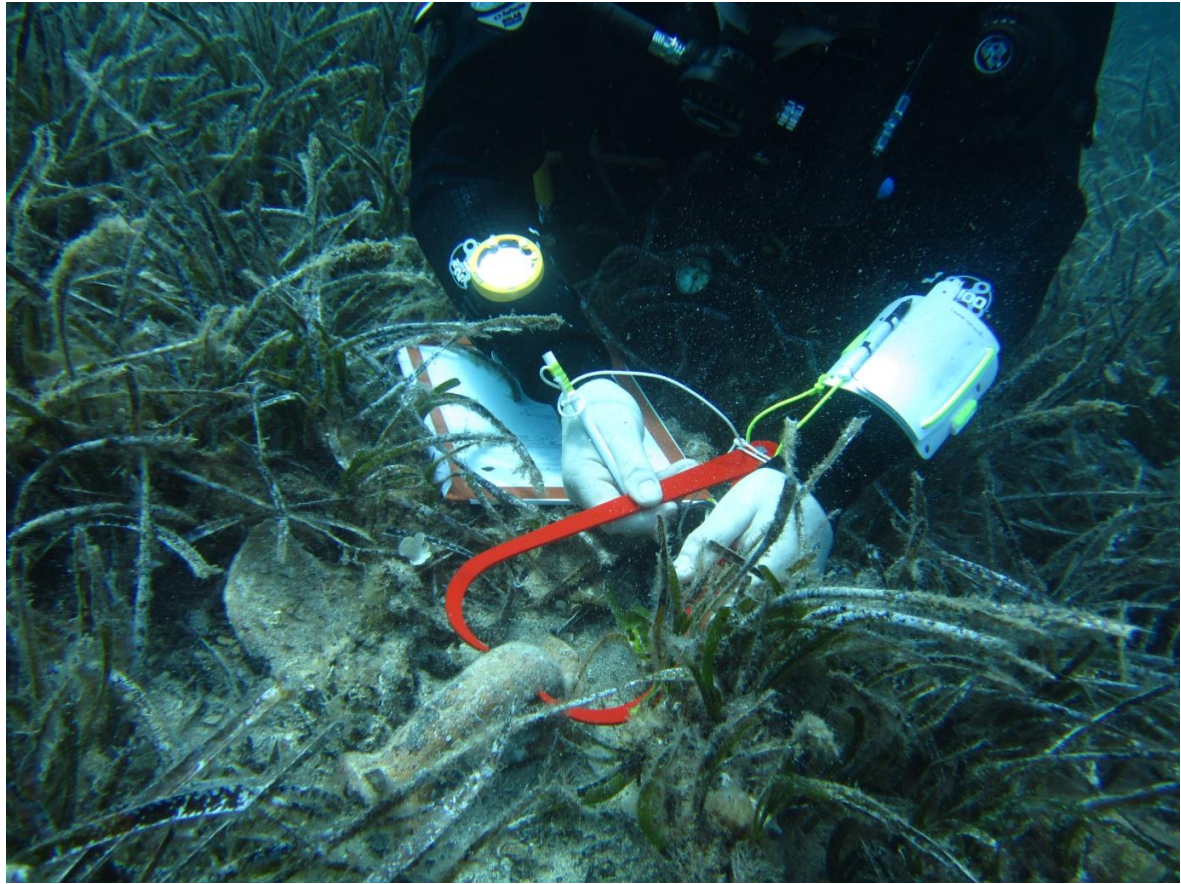


Figure 3. Calipers on handle. Photo Roger Wallace



Figure 4 Amphora mound. Photo Roger Wallace



As well as the scatters we also found a mound largely constructed from amphora and similar pots with four discrete sea grass free areas that seemed ideal for recording (Fig. 4). Because the remains were substantial and the colour forms were varied it was also very useful for an experimental use of Dulux paint colour charts as an alternative to using a Munsell Chart that cannot be taken underwater (Fig. 5).

This experiment was undertaken by a diver who had just completed her foundation year for a Fine Arts Degree who was very aware of the process of colour matching and who was helpful in refining how the colour charts were used. The final results presented later in the report suggest the idea works in principle, but the way the colours are presented for underwater use needs development.

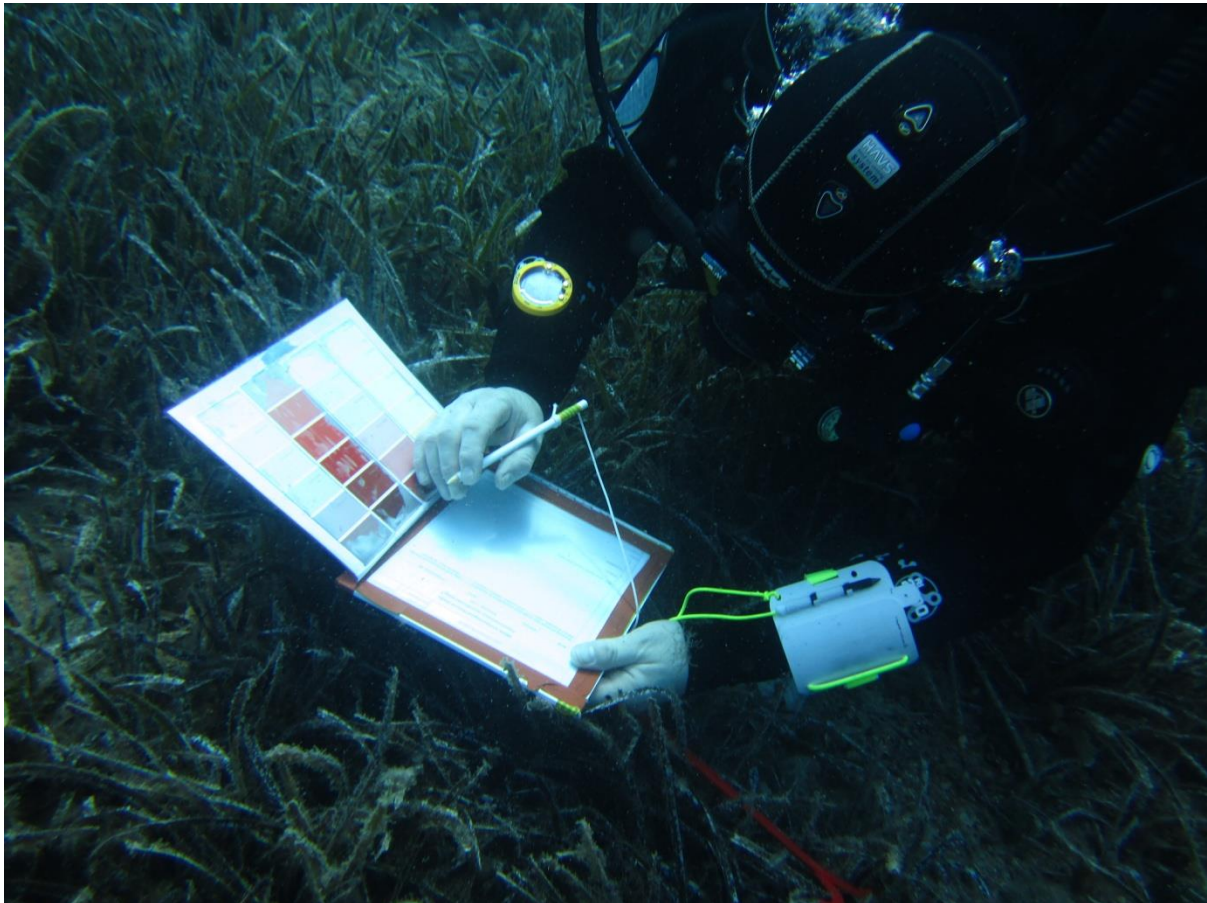


Figure 5. Paint charts in use underwater. Photograph Roger Wallace.

Finally the team developed their knowledge and understanding of using tapes and taking measurements underwater using base lines and transects to produce offset measurement records. They took photographs, used scales (mostly) and became adept at recognising pottery underwater. They learnt to use callipers and record results on underwater drawing boards and the importance of completing record sheets for the archaeology of each dive before the next dive.

## **Introduction**

### **Survey Methodology**

The survey methods used during the project included base line survey with offset measurements, measured sketches using tapes and callipers, still photography and video recording. The team were given practise in using A4 boards with graphed permatrace (Fig. 6). An archaeological plan was developed (partly reflexively) as each dive progressed, based on the skills of the team and the complexity of the sites. Before each dive an archaeological brief was given and tasks allocated which tried to take in to account the individual strengths of team members, and the sort of diving they liked best. In-water coaching was available when needed.

All diving pairs had to complete their log sheets at the end of each dive. The log sheets were based on the sheets used by the Museum of London Archaeology Service (MoLAS) 1994 edn.

Colour descriptions were based on Dulux paint colour charts which as part of a methodological experiment were then correlated where possible with the Munsell Soil Colour Chart 2000 edn.

### **Aims**

Locate and survey distributions of archaeological material, specifically ceramics, and where possible to identify those ceramics.

Trial two methods of recording that might be useful for divers working without archaeological training:

- Using paint colour charts to record the colour of the ceramic material
- Using pool float markers to enable a distribution map to be created in rocky areas where it was not possible to put tapes directly on to the seabed. We were not able to carry out this experiment as the site that was eventually selected for in-depth survey was not suitable for attaching floats.

### **Survey methods**

Most of the team had not had much if any experience of archaeological survey so a progressive programme of on-site training was established, the tasks becoming more challenging as the week progressed:

- Shakedown dive, sending up dSMBs if ceramics found
- Laying baselines in a specified compass direction on flat seabed
- Putting in transects (corridors) at 5m intervals, swimming out tapes and recovering
- Baselines and transects on slopes-close investigation to get their eyes attuned to ceramics
- Measurements and photographs with scales of large body sherds
- Measurements, photographs and drawings of three major assemblages of material.
- At the end of each dive each buddy pair completed the relevant archaeological log sheets.

Unfortunately the wind blew from the south all week so we had to move to sites sheltered from the southerly winds.

The wind direction meant that we could focus on Lumbarda, and areas near the dive centre in particular the deposits on the area of the Isolated Danger Buoy at Lucnjak. Even in this sheltered area

the Bora, a seasonal wind, meant that we had to wait for the sea to drop in the afternoon before we could dive.

## Site reports

### Day One 26 September 2011

**Dive One: Lumbarda 42° 55.981N 17°09.864E to 42°56.00N 17°09.876E**

#### Method

50m jackstay set out and the team were buddied up and tasked to run 30m tapes out at right angles from the baseline at 5metre (5m) intervals running approximately East (see diagram).

This technique allowed the team to practise:

- Running out survey tapes and recording offsets on to A4 underwater boards.
- Observing underwater
- Recording underwater
- Recording position of survey area using SMBs to mark start and end points of the baseline on to the GPS position finder

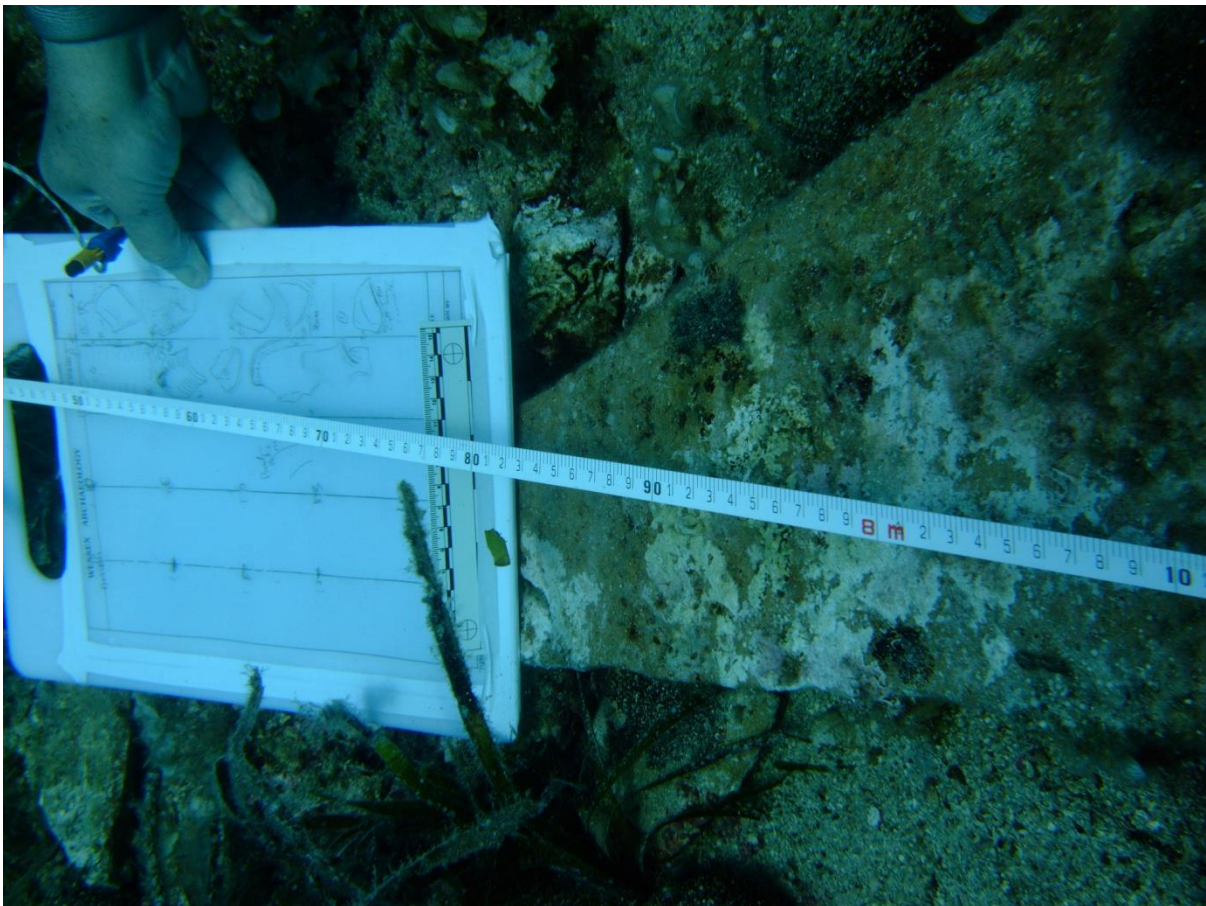


Figure 6. Transect tape with marked board. Photograph Trevor Lee.

The bottom was mainly sea grass with some sandy patches with visibility of about 10 metres. The sand was coarse and easily stirred up, but then quickly settled. It was possible to run tapes out fairly

simply, but small kinks in the tape alignment needed to be corrected after they had been put down. The transect tapes at right angles (and 5m intervals) needed a little more practise because failure to swim out at exactly 90° to the base line led to some friendly and frustrating encounters with other pairs running their tapes out. Because the sea grass was so thick the divers had to work very carefully to make sure that they missed as little as possible.

### **Results from Dive One**

Some concrete lumps were found at the western end of the base line and a small upturned pot at 45m south at 18.3metres east. There was evidence of anchoring: scours in the seabed where the sea grass had been torn away.

The dive was marred by the loss of a dive computer. The SMB was left in position and the team went back once cylinders had been refilled. A small team did a close search of the seabed in the area of the morning survey and the computer was found quite quickly. This, in very thick sea grass, was very pleasing.

### **Dive Two Lumbarda Bay 42°56.0076N 17° 09.876E to 42° 55.950N 17° 09.867E**

The bottom was similar to the bottom we had on Dive One. Again nothing was found, but the speed and efficiency of base line and transect line-laying had improved. The organisation needed to lay the tapes and the way the pairs organised the task was noticeably more confident.

### **Results from Dive Two**

Nothing archaeological found. A small toy car and a very small *ambi-pur* bottle were found, as well as one small piece of transfer printed pottery. The size of these pieces, which could be covered on the bottom by the palm of a hand, demonstrated the care that the team were using in their survey.

### **Day Two Dive Three *Steve's Patch* 42° 55.950N 17° 09.864E**

This area has been used as a transit area for fishing vessels for some time. It is a short cut between two rocky areas that can be used by small boats. Local tradition also suggests some trawling activity over many years. Steve Collett had seen pot there and had said it was scattered as a result of fishing activity. The bay is shallow (max 15m) and had large sandy patches that would allow the team to look for pot in an area not covered with sea grass. This would help the team to be able to distinguish potsherds against a sandy background and do some basic measurements and photography. They had been briefed to look for straight edges, or subtle curves in the seabed.

### **Method**

For this dive it was decided to put in two datum point then send two teams in, one around each main datum point, to swim in the area looking at the bottom for any potsherds. When material was found a dSMB was deployed by the buddy pair, the position was taken using GPS, the pot was recorded and then the divers moved on. Each pair carried several dSMBs. Using Direct Survey Measurements (DSM) to create an accurate distribution map was briefly considered, but the material was not likely to be in context, so it was decided to plot the find position using the boat's GPS taken over a tight buoy line.

Any pot found was recorded in outline on the dive log sheet completed by each pair, and a fuller description was written up on the ceramic/pottery record sheet.



## Results

Archaeological material was found at seven find spots. The material was largely abraded and broken, but some pieces had crisp edges, suggesting the breaks were recent. The pots were drawn and photographed. Some measurements were taken, others chose to draw by eye.

The find spots were:

1. 42° 55.999N 17° 10.042E
2. 42° 56.000N 17° 10.027E
3. 42° 56.008N 17° 10.052E
4. 42° 55.934N 17° 10.059E
5. 42° 56.000N 17° 00.058E
6. 42° 56.016N 17° 10.480E
7. 42° 56.000N 17° 10.007E

In retrospect it would have been most useful for the divers' dSMBs to be marked with the divers' names so that the measured drawings could be related to the position. More consideration should be given about how this could be made an effective communication method to relate the position to the drawings if spot accuracy of position is required

Jim Mills and Roger Wallace took one of the colour charts (Fig. 5) and used it in their description of the broken ceramic pot that they found during the dive (fig.7). Underwater the pot they examined correlated closely to Dulux *Hot Paprika 5* which then correlates approximately to Munsell 1OR 6/6.9

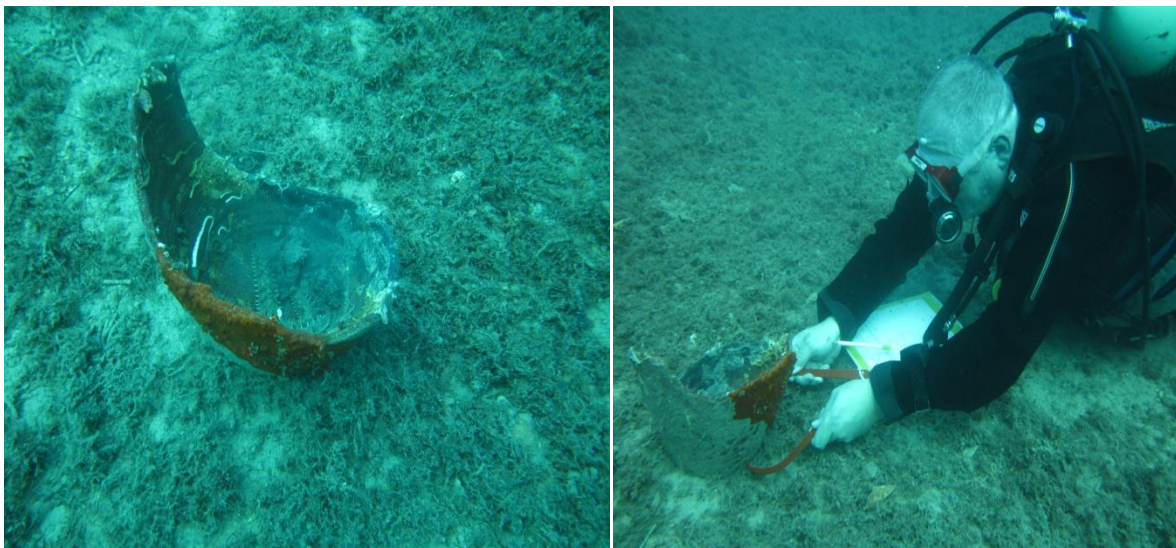


Figure 7. The pot showing use of callipers. Photograph Roger Wallace

This was encouraging for a first attempt. Photographs would have been improved by the use of a scale.



REDS Archaeological Record Sheet

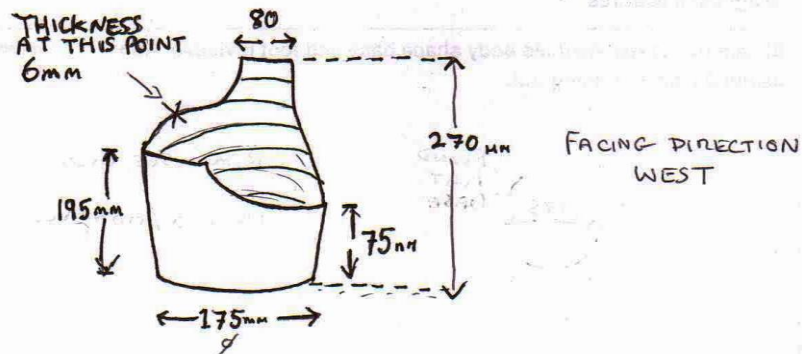
Ceramic/pottery record

Korcula 2011

SITE REDS #/2	Log references: photo, diver JIM + ROGER.	Area	
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(STEVE'S PATCH)

Drawing (include bar scale and orientation) to include both sides and thickness of sherds where possible. Written measurements should also be given.



Description: base rim body sherd neck handles unsure

POT BASE WITH LARGE PART OF BODY PRESENT NO HANDLES OR RIM PRESENT. INTERNAL MARKS INDICATE IT WAS HAND THROWN GRAINY SERVICE.

Condition: abraded rolled fresh break

GOOD CONDITION NOT ABRADED BREAKS OLD BUT NOT WORN.

Colour:

HOT PAPRIKA 5 ON UNBURIED PORTION DARKER ON PARTS THAT HAD AT SOME POINT BEEN BURIED.

Most close Munsell correlation. 10R6/6. Dulux

Figure 8. Record sheet with illustration of potsherd in figure 7.

The other divers all completed record sheets producing measured sketches of the pot fragments they had found. The remains varied. A triangular fragment had rolled edges and a yellowish hue measuring 73mm by 80mm by 95mm with a rough sandy surface and a smooth feeling inside. One

piece showed a rim fragment with some neck attached, a pale brown colour, quite abraded. The lip section measured 100mm long and was 60mm high. The neck had a subtle grooved pattern. No photographs were taken.

One pair found a body sherd with the base still attached (fig 9). It was terracotta and felt gritty to the touch. The colour was said to be brown and fabric unglazed. No other pottery was found in the vicinity. This type of fragment was typical of material found on this site. The other fragments found were body sherds, varying in size and colour. The chief value, because of the very disturbed nature of the seabed, was a useful practise area for the team to get in to good habits. Careful measurements were taken, but the lack of scales meant that the photographs were not as useful as they could have been.



Figure 9. Body sherd in Steve's Patch. Photograph Trevor Lee

Following discussion it was decided to do the second dive of the day at Plic Lucnjak. This submerged site is a rocky pinnacle rising from 43m to 7m in an area with restricted navigation. It is currently marked by an Isolated Danger Buoy (IDB).



**Day Two. Dive Four Isolated Danger Buoy 42° 57.616N 17° 09.880E Plic Lucnjak 27<sup>th</sup> September 2011**

**Task**

To find and record deposits of pottery, photograph, draw and measure any such deposits and send up dSMB to allow the positions to be taken.

**Method**

Divers were sent down to do a free swimming survey so that we could start to see the potential of this site. Divers were to put up dSMBs if artefacts were found. The RHIB would then take the Lat/Long co-ordinates on the GPS as on the previous dives.

Two teams took down colour charts and scales. All pairs took tapes.

**Results**

This was a spectacular dive that really enthused the team. They had spent three dives practising a number of techniques and making as much as possible from very sparse material. On this site there was ceramic material all over the mound. In some areas the mound was made of broken amphorae.

The following positions showed substantial fragmentary remains:

1. 42° 57.615N      17° 09.860E
2. 42° 57.606 N      17° 09.858E

The material was varied in remains, style, colour and condition. The divers noted that remains consisted of large body sherds of 250mm by 160mm and 20mm thick, with colours Dulux Eastern Spice 1 and 2 which correlated reasonably to 7.5 YR 6/8 and 7/8 in the Munsell 2000 Soil colour chart. There were a number of handles attached to body sherds and some bases which tended to be rounded spikes (fig.10).

One pair found several clumps of broken pottery pieces. They selected four pieces to draw and to attempt to make a colour match using the paint charts. They identified a neck with handles, a body sherd and one conical base spike, but were unable to do a colour match with any confidence. However they did an approximation based on the apparent colour with unmasked colours (a colour surrounded by a darker border to avoid white affecting the interpretation of the colour value).

The descriptions of the pottery included a body sherd with handle approximately matching to Dulux Roman stone 1 or 10YR5/3 brown and a base approximately matching Dulux Hot Paprika 5 which could be correlated to 1OR6/6

**Day Three. Dive Five. Plic Lucnjak Isolated Danger Buoy 28<sup>th</sup> September 2011 42° 57.616N 17° 07.880E**

**Task**

All diving pairs were sent down a marker buoy at 42° 57.612N and 17° 09.851E which were said to mark a concentration of ceramic remains. The dive pairs were asked to find material which could be diagnostically useful for example handles, necks, bases and decoration. Where possible photographs

should have been taken and measured sketches made. Those who were able to do so were given graphed permatrace and were asked to draw to scale.

## Results

This was a productive dive. At nine metres a substantial amphora was found, broken into three large pieces. This had been a large pottery vessel. The sherd was provisionally identified as the base 25mm on one edge of the material, two large pieces provisionally identified as body sherds had 10mm walls. The sherds were abraded and had possibly been exposed to tidal movement.

An amphora base was found approximately 140mm long and 40mm diameter. The same pair also identified a neck with a star pattern. It was not possible to prove that both pieces came from the same vessel.

Other pieces were found.

It became evident that most of the remains were on top of the rock. It was likely that other material from other events had possibly rolled down the slope and were deeper than we were able to dive. It was also more likely that more intact vessels that could be identified to type and period were in deeper water. The charted maximum depth there was 41 metres.



Figure 10. Typical amphora top found on dive five. Photo Trevor Lee

It was decided to focus the dives on the following day to see if it was possible to establish where the distribution of material was greatest. The area to be targeted was the near the top of the mound which gave the flattest profile, by using base line and offset measurements. The baseline would be set west to east with transects running to the south for the first run from seven and half metres depth.



**Day 4. Dive Six 29<sup>th</sup> September 201. South west side of the Isolated Danger Buoy Plic Lucnjak  
42° 57.612N 17°09.851E**

**Task**

Offset survey from a 30m base line laid at 7.5m depth running from west to east at that depth. The first transects were laid to the south with the second phase to the north for divers who had sufficient gas or time. The transects were at 5m intervals along the baseline to allow effective coverage. Two divers were sent to do a swim-over at about 30m depth to see what might be there and what condition any material could be in.

All teams found that the greatest concentration of ceramic remains was between the seven metre depth mark to 15m depth. So much material was found that it was not possible to record the distribution with accuracy in the time allowed. The number of substantial remains of necks, shoulders, handles and body sherds was further complicated by the various alignments of the pieces. In some areas the whole of the mound was made from potsherds lying in complex alignments. Some material was found at 30m south from the baseline in deeper water (25-30m), but the remains were far more scattered than at the shallower depth. The lines were laid efficiently, and the transects swum accurately.

A possible explanation for the distribution could be that vessels hitting the rock in much shallower water capsized and deposited heavy ceramic deck cargo in the area closest to the top of the rock, before finally settling in deeper water elsewhere after being carried by the strong tidal streams.

The pair given a roving brief found an almost intact amphora at 30.9m depth (Fig 11). In subsequent dives it became apparent that there were several reasonably intact vessels below the 30m mark.



Figure 11. Amphora showing level of preservation. Photo Dave Warren

## **Day 4 Dive Seven 29<sup>th</sup> September 2011 Plic Lucnjak**

### **Tasks**

The dive team selected vessels or remains of vessels to draw. The drawings could be to scale underwater, or careful measurements taken to draw back at the centre. This was a final development of the training delivered over the previous days. Kloe Porter and Rhys Morris were tasked with the first attempt at using the colour charts underwater. Kloe had just completed the first year of a fine arts degree and had a good understanding of the factors supporting colour discrimination. The experiment and results will form a later part of this report.

### **Results**

New areas were identified as being good areas for some general recording. The large amphora had been photographed and a scale drawing using a planning frame was seen as the best way forward at that depth for a quick and fairly accurate recording method.

The result of an initial foray with the colour charts was discussed. The divers had found four exact matches, three matches between two colours and seven attempts with no matches. Kloe and Rhys planned the next day's diving and agreed the tasks and targets. This meant a more efficient use of time, especially as the target areas could become quite crowded.

Once all the reports had been delivered at the end of the day it was decided to relocate the GPS positions for the final day to

1. 42 57.609N and 17 09.867E for position 1 shallow datum
2. 42 57.612 N and 17 09.851E for position 2 deeper datum

This would take the divers directly to three large open areas with substantial exposed amounts of potsherds on a coarse sand seabed so that dimensions of the patches could be measured and specific potsherds drawn for the final dive on site on September 30<sup>th</sup>.

## **Day 5 Dive Eight. 30<sup>th</sup> September 2011. U. Plic Lucnak 42 57.609N and 17 09.867E.**

### **Tasks**

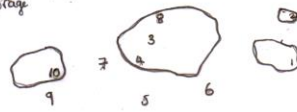
Three small areas with substantial deposits were measured at 42 57.609N and 17 09.867E. These were distinct scatters at seven and a half metres depth running from west to east. Then scale drawings were made of amphorae with diagnostic features on the top of Plic Lucnak. Measured sketches were made of two substantially intact amphorae on the southern slope and a final trial was made of the colour charts by Kloe Porter and Rhys Morris using the expertise of divers studying for a Fine Arts degree.

Matt Drage and Roger Wallace were assigned to area one, Gary Stroud and Jim Mills to area two and Simon Pillsworth and Andy Nicholls to area three. Dave Warren and Trevor Lee were tasked to use the planning frame to record the almost intact amphora found the previous day. Ian Clarke was asked to draw the three amphorae that were on the top of a mound of pottery showing rims to shoulder and handles.

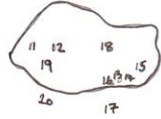


Rhys Morris & Kloe Forbes Colour match equipment 30.09.11  
Area on South West Corner of the IDB  
at 8m depth.

Area 1  
Roger Wallace  
Matt Drage



Area 2  
Gary Stewart  
Junk Mills



Area 3  
Simon Pelsworth  
Andy Nichols



Sketch plan showing relationships



NOT TO SCALE.

Figure 12. Sites recorded on the final day including colour matching references.



Figure 13. General density of remains on the SW side of the IDB. Photograph Roger Wallace.

## Results

The measuring and recording of the three areas was completed, most divers working in excess of 80 minutes. The three well-preserved rim to shoulder amphorae were drawn to scale and photographed *in situ* and the large almost intact vessel at 30.9 metres was relocated, drawn using a planning frame and photographed.

The colour card experiment is reported on separately.

### Area One

This measured drawing shows an area 4m long by 3m wide at the widest point with substantial remains. Some of the remains are large pieces, some are obviously from the same pottery vessel, although the no touch policy precluded us from attempting to match edges. The measured sketch does not include many of the end-on fragments that littered the site. There were also handles and bases scattered throughout area one (Fig ).

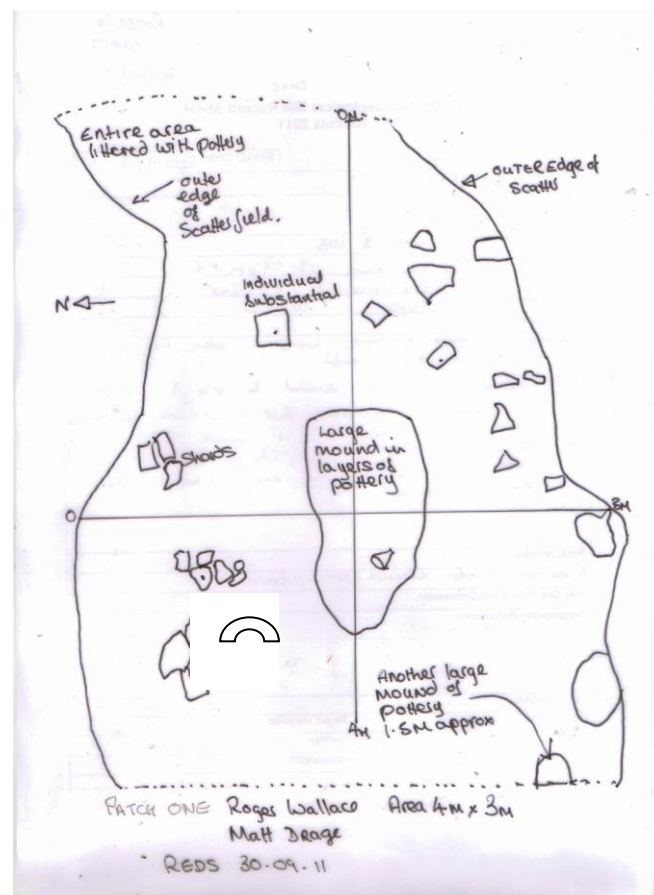


Figure 14. Distribution of potsherds in area one.



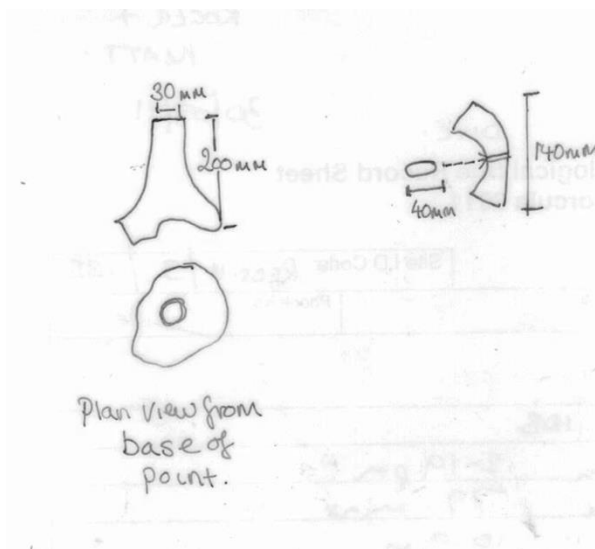


Figure 15. Handle and base from area one.

### Area Two.

On the same alignment as area one this patch was approximately 2500mm and contained a lot of body sherds in various alignments. As well as the large body sherds there were two amphora necks which were drawn to scale underwater before being drawn up on permatrace. The position of the pieces is indicated on the plan view of the patch, although the pieces are not identified as fragment one or two. The views of the drawings were plan and elevation because the vessels were easier to record. They correlate top 12 and 19 in the colour chart experiment (fig ).

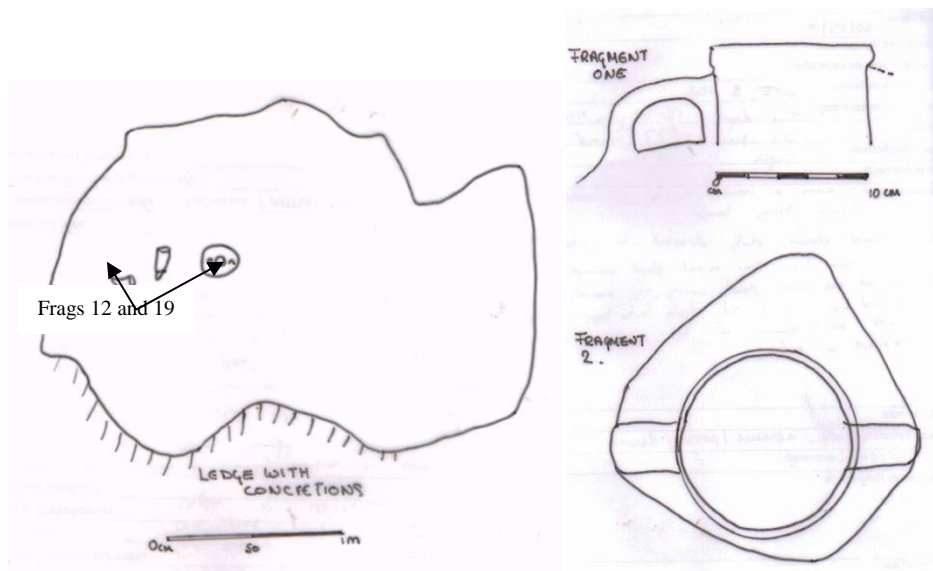


Figure 16. Measured sketch of patch and scale drawings of amphora necks in area two.

### Area three.

This area was at a depth of 7.8metres and approximately three metres in length and had substantial though fragmentary remains. There were quite a few bottom spikes and isolated handles lying on the surface with the body sherds as well as more substantial pieces.

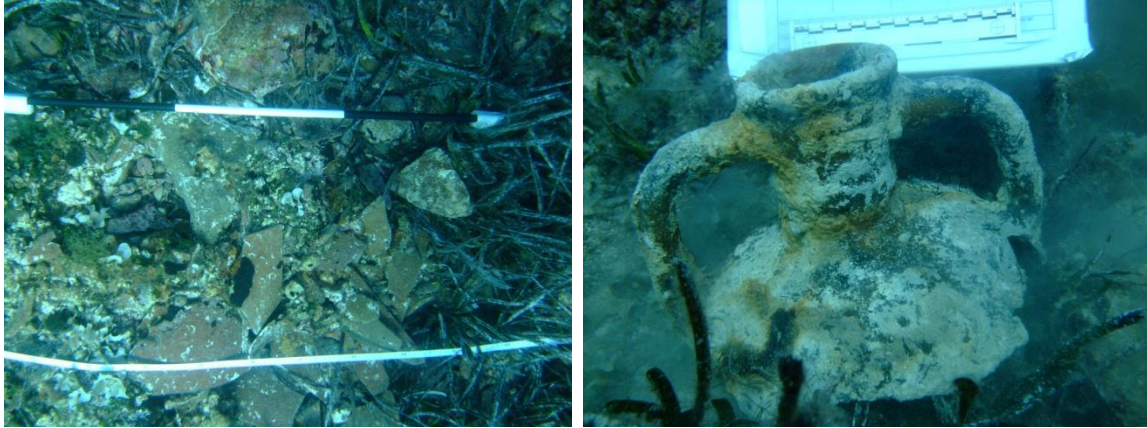


Figure 17. Area three showing variation of remains. Photographs Andy Nicholls.

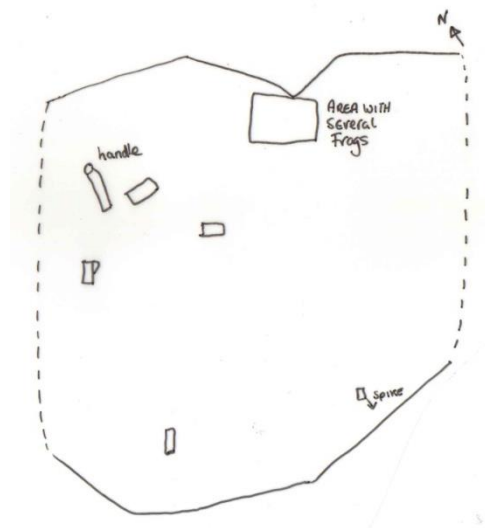


Figure 18. Area three

### Deeper amphorae.

Position 42° 57.600N 17° 09.825E

Trevor Lee and Dave Warren recorded two largely intact amphorae on this dive. Amphora A was at 29.5m and amphora B was close by (less than 20m away) at 30.6m depth. Amphora A was less intact than B.

Amphora A had no neck or handles but amphora B was more intact with a large piece missing from the base.

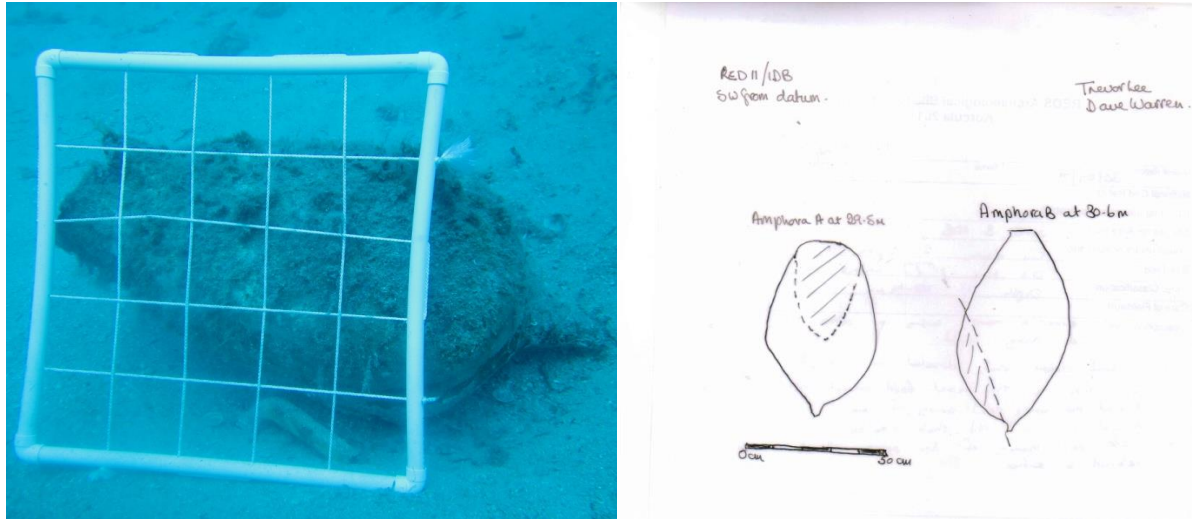


Figure 19. Amphora B with planning frame and measured drawings of amphorae A and B. Photograph Dave Warren

The existence of two substantial vessels at or around the 30m mark would suggest that further exploration towards the deeper water around the Isolated Danger Buoy might give some useful results.

#### Area round the Isolated Danger Buoy

Drawn record: Ian Clarke

During the project it became apparent that Ian Clarke was very precise when drawing underwater. He was tasked with drawing three pottery pieces. The pieces were at 9.3m and showed diagnostic features. The material was terracotta and seemed brown in colour. They were not the pieces targeted by the colour chart experiment team.

On top of the main mound on the IDB site were three clearly visible vessels. The pieces Ian drew were just below this. They stood out from the mound of potsherds as they had fallen into a void caused by the break-up of a much larger vessel.



Figure 20. The mound top. Photograph Roger Wallace



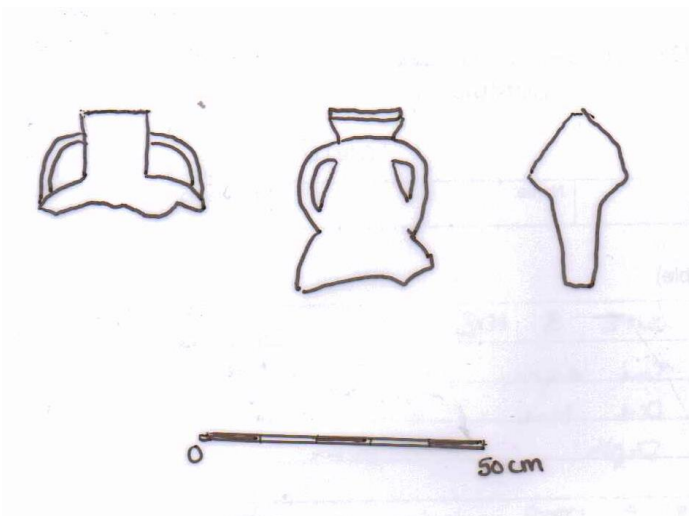
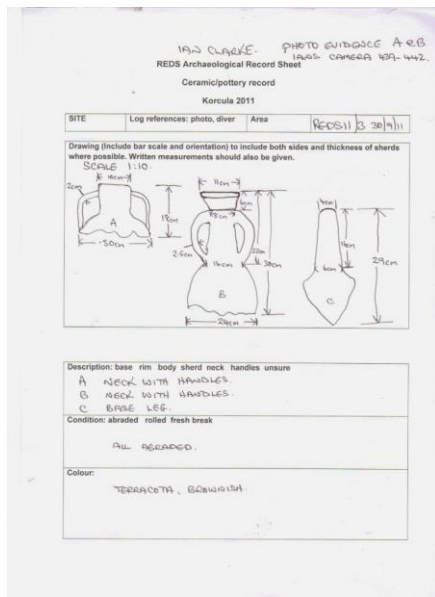


Figure 21. Log sheet with measurements and permatrace measured drawing. Drawn by Ian Clarke 30 09 2011

The variations in the work produced by each group are because the teams were sent down with limited training and a short time on a dry run at the dive centre. They made their own decisions about what to record and how to record it and they all performed well. If we had been returning to the site we could have had a group debrief and decided on a 'team methodology' before the next dive using the experience of the groups to arrive at something they all felt competent to do. However the results showed that this was a complex site with many different alignments and fragment types. Their results were much better than their level of training and experience suggested they would be capable of achieving.

### Further work

It would be interesting to target the 30-40m depth contour for a careful search. The reconnaissance team found a largely complete amphora at 30m depth. Most divers don't go to those depths, and boats would not wish to anchor in 30m plus, so the chances of a higher level of survival of material at this depth seem to be increased.

Our group were rigorous in our policy of no interference. We did touch the material with tapes, and callipers, but did not move the material or disturb the sediments. The site does not appear to be at risk from non-environmental disturbance, but it would be useful for a diving pottery specialist to see the site and identify the main phases of material around the buoy down to the 40m depth contour.

## Colour chart experiment.

### Introduction

Identification especially of pottery fragments depends on a number of observations made about the fabric of the pot. One of the observations that can lead to the identification of a pottery type, and therefore its likely age and country of origin concerns colour. The personal assessment of colour has been found to be subjective; one individual may see a blue/green colour, while someone else may be quite clear that it is turquoise. This difficulty in colour perception has been recognised for a long time in the disciplines of geology and archaeology and the solution to the difficulty of recording colour

accurately has been addressed by geologists by the construction and use of the Munsell Soil Colour Chart. The Munsell Chart uses fine colour definitions in a variety of colours in which samples of sediment are taken then put onto the chart which has a series of graded colours and hues which appear in small windows surrounded by grey borders until a match is established between the sediment and the colour of the background in the window. This match is then able to be identified with a series of numbers corresponding to the colour (hue) the lightness or darkness of the colour (value) and the brightness of the colour (chroma). Once identified the colour has a code which can then be matched against that code colour anywhere in the world [[www.http:// Munsell.com](http://www.munsell.com) accessed online 20 7 2012].

Because the colour chart is a booklet it could not be taken underwater. We could not use it on samples that we could take back to the surface because in Korcula we had a strict no tampering policy which meant that no material could be lifted and no samples taken (Fig 22).

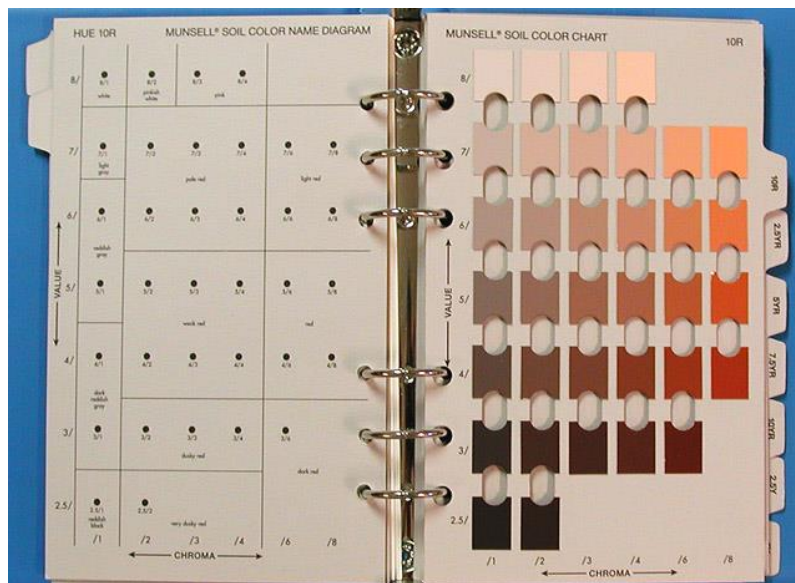


Figure 22. Munsell colour chart: [www.http://munsell.com](http://www.munsell.com) [Accessed online 5<sup>th</sup> February 2013].

### Aim.

To examine the effectiveness or otherwise of using paint colour charts as a method of recording colours of ceramics underwater in lieu of a Munsell Colour Chart and to make relevant recommendations about the use of the paint card technique.

### Method

A selection of paint chart strips were encapsulated in 100gsm laminate. There were three sets of colours. The divers were asked to place the colour charts next to the amphora or ceramic to see if they could achieve a colour match. They were encouraged to use torches, even though the visibility was excellent, so that there could be some consistency in the colour irrespective of the effect of depth on the colour. Once they had identified if a match or close match or approximate match was possible they then wrote the name of the Dulux colour on the record sheet by the pot they were working on.

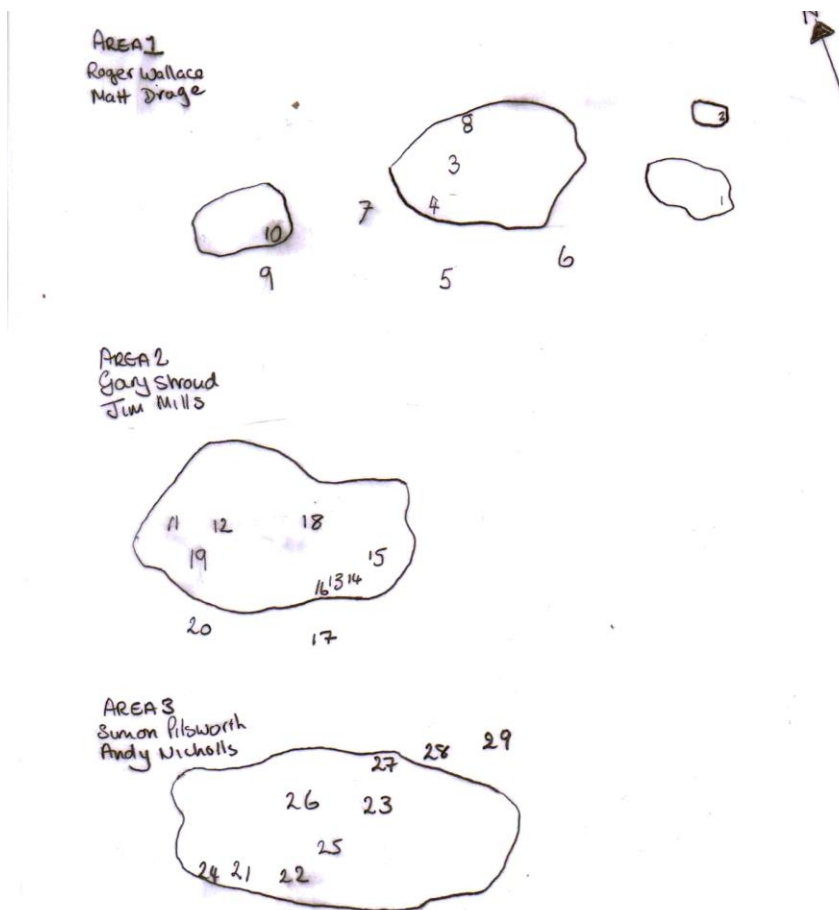


Figure 23. Colour match attempts made with sample numbers.

**Results.**

Drawing Number	Area number	Description	Colour match	Comment
1	1	Body sherd	between Hot Paprika 2 and 3	Hard to find colour-pot had growth
2	1	neck	Harvest fruits 1	Good match
3	1	base	Hot paprika 4-5	Reasonable match
4	1	handle	Harvest Fruits 1	
5	1	base	No match	Cards too orange
6	1	base	Closest to wild mushroom	
7	1	base	No match	
8	1	handle	Harvest Fruits 1	Good match
9	1	handle with body sherd	Between Hot Paprika 5 and 6	
10	1	bottom	Between Hot Paprika 5-6	
11	2	neck	No match	Too orange
12	2	neck	No match	Too orange
13	2	base	Between Hot Paprika 4-5	
14	2	handle with neck and rim	No match	Too orange



15	2	body sherd	Harvest fruits 1	
16	2	neck and rim	Between Hot Paprika 5-6	
17	2	body sherd	No match	
18	2	2 handles with body sherd and rim	Between Hot Paprika 5-6	
19	2	handle	Between Hot Paprika 5-6	
20	2	handle	Between Hot Paprika 3-4	
21	3	base	Between harvest Fruits 2-3	
22	3	body sherd	No match	
23	3	handle	Sultana Spice 3	
24	3	base spike	No match	
25	3	handle with body sherd	No match	
26	3	base spike	Wild mushroom 2	
27	3	large body sherd	No match	
28	3	body sherd	Harvest Fruits 1	
29	3	neck	No match	
30	3	Body sherd	No match	

Table 1. Results of colour matches on the IDB mound on 30 September 2011.

### Discussion of results

30 matching attempts were made. The ratio of partial or better matches to no match was 3:2 (eighteen good or close matches to twelve where no matches were possible). These figures can be broken down as seven very close matches, eleven matches that were close to or between colours on the chart, and twelve 'no matches' five of which were said to be too orange. Some sherds were matched to the colour chart, but most were in between two colours or had a slightly different hue. The results show that the Dulux cards had too many orange hues to enable a match in four cases.

Immediate post dive evaluation showed that the results were variable even though torches had been used. The variation in reliability was likely to be because the colours were difficult to see in some cases as de-lamination became an issue. The reliability of the colour matches was further questioned because the background to the underwater charts was light and there were too many colours on one sheet. There were further observation about the time taken to write down the whole card name and number. This was considerable and with a large assemblage meant some areas had not been looked at.

### Conclusions

This was a first attempt at trying to produce an answer to the very difficult question of how to ascribe a colour to a piece of underwater ceramics where it was not possible to take fabric samples. The cards chosen had some relevance, but not enough to cover the range of colours we saw underwater. The colours we did apparently match were not sufficiently isolated from a light background, and were further compromised by having too many colours on the cards that meant the potential matching colour could not be put close enough to the potsherd. The use of colours that were too orange meant that other more appropriate colours were not on the sheets taken down by the divers.

There were sufficient matches identified to suggest that this experiment showed that the technique had some value, but would need a comprehensive rethinking before it could be useful.

## **Recommendations**

### Personnel

- The work should be overseen by someone with knowledge of the theoretical background to the identification of colour. Where possible that person should dive the site with a torch to identify a range of colours that could be applicable to the assemblage.

### Colour chart organisation

- Several smaller charts with a thin, black, frame would have made it easier to put the colour right next to the pot. It may be more efficient to produce a key fob type of colour set, backed with black and held together by a chain or split ring.
- a more robust laminate would have meant a more productive result
- Assigning each colour a number rather than working with the whole code would allow the colour to be documented in full on the surface, with minimum use of time underwater.

## **Miscellaneous**

- A wider torch beam would allow colours to be illuminated better on the smaller laminated cards.

## **Conclusion**

The aims of the underwater aspects of the project were to locate and survey the distribution of ceramic material and where possible to identify the ceramics. We also wanted to undertake a small scale exploration of a method of identifying colour underwater when fabric sampling was not permitted. A further experiment on the use of floats in a rocky area to help create a distribution map was abandoned when bad weather meant we could not get to our target site.

The report on the colour matching experiment suggests it may have some uses in areas where taking fabric samples is not permitted although the method and equipment used need a lot of thoughtful development.

We did locate an area with substantial ceramic remains on the submerged rock outcrop identified by the Isolate Danger Buoy on the south west corner of Lucnjak. This rock rising from 43m to 7m has managed to wreck or seriously damage a substantial number of vessels. The material was so dense in places that it made recording very difficult for a team new to the task.

In the first two days of the expedition opportunities were taken to train the group in survey and recording techniques. The group were very hard working and wrote up the record sheets after every dive without complaint and were able to develop skills over the week.

Once we moved to the Isolated Danger Buoy site it became apparent that the assemblage here could be quite important for confirming evidence for trade routes and cargoes over a considerable period. Although a lot of this material consists of body sherds there are a substantial amount of ceramic material that could be identified to type and date by an archaeologist specialising in trade routes and trading links from the ancient world. The topography of the islands and mainland would tend to

suggest that travel by sea was easier than overland so the assemblage around the IDB could give useful information.

The identification of particular vessels to date and cargo was difficult because we could not take an adequate fabric description because of our no-disturbance policy, and we needed to measure much more closely and use scales with every photograph to get a secure identification.

The archive of all the log sheets and a copy of this report will be sent to Korcula.