The *REDEMPTORA*

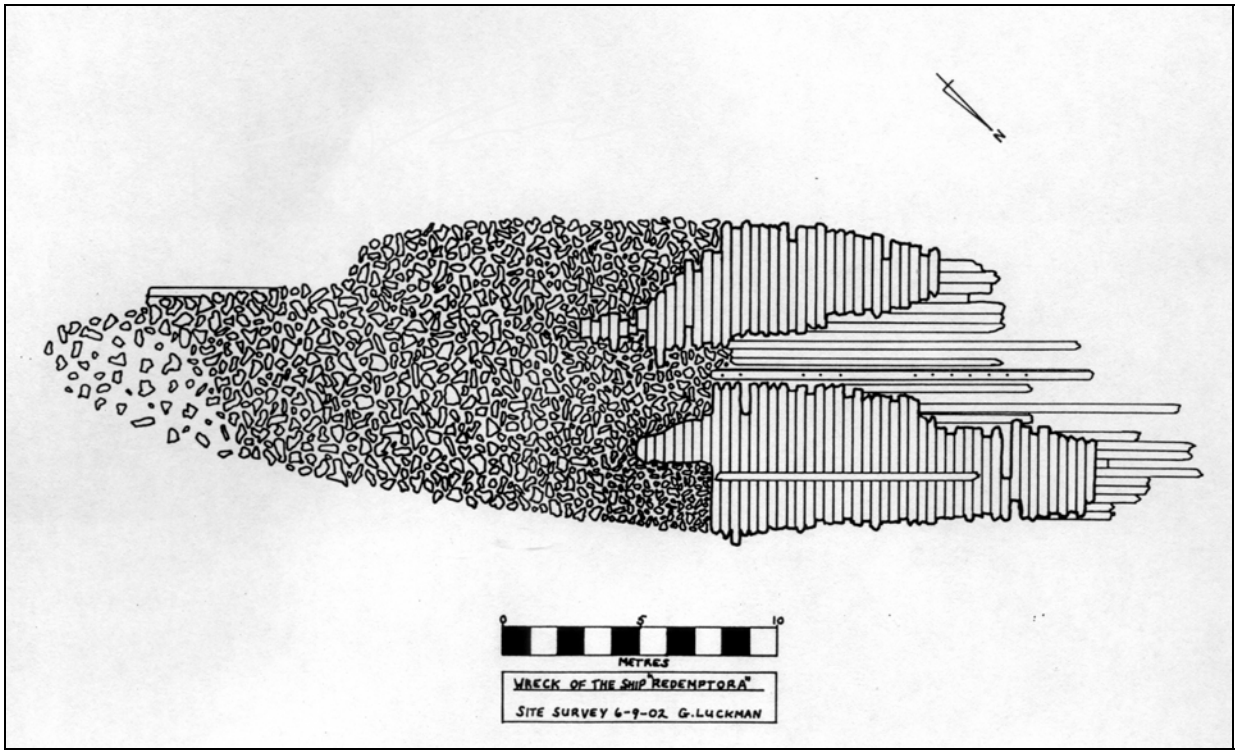

Figure 1. Plan drawing of the *Redemptora*. Drawing G. Luckman.

Compiled by:
Matthew Gainsford 2003

Report-Department of Maritime Archaeology
Western Australian Maritime Museum No. 166

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INTRODUCTION:

The *Redemptora* is a wooden vessel that is thought to have been, wrecked or stranded in what is now Jervoise Bay, Cockburn Sound. The vessel lies in 2.5 to 3 m of water but in September 2002 the vessel was reported to be partially exposed, because of the removal of ballast off the site. It appears that the ballast was removed from the site some time ago, possibly up to two years and the degradation across the site supports this.

The WA Maritime Museum took the initiative to assess the site after they were notified that some of the ballast had been removed. This prompted a site inspection and a High Precision Acoustic Surveying System (HPASS) survey. This acoustic surveying system allowed a detailed plan to be developed by taking a series of points across the site. The system uses sound which is bounced back from transponders around the site to fix a position in the network. This survey was conducted by students from the Museum as one of their ongoing projects for their Graduate Diploma in 2002.

After the survey and site inspection were concluded it was decided to replace the ballast that had been removed from the site. This was conducted over a period of eight days when the ballast was lifted and moved across the site where it was deposited to restabilise the wreck.

Site Inspection:

REDEMPTORA
WRECK INSPECTION REPORT
Inspected 6th September 2002
ca. 1853 to16 October 1888

Introduction

The wreck of the *Redemptora* is a wooden vessel that, until recently, was covered by a ballast mound. Recently it was noticed that ballast had been removed from about half of the wreck site exposing the wooden structure to the elements. The WA Maritime Museum was notified of this matter and subsequently sent a group to investigate the newly exposed site. At the time Museum staff took digital photographs and created an outline of the wreck with the help of a hand-held GPS. It was decided that because the wreck had been exposed, a strategy should be put in place to gather as much information from the site while it was uncovered. Masters of Maritime Archaeology students, that were attending the Museum as part of their course, were invited to conduct a detailed inspection and survey of the wreck. This was accomplished over six days and concentrated on developing a database that would provide essential information regarding the site for use in the future.

Historical Information and Identification

The *Redemptora* is a vessel of American origin being constructed in The United states of America around 1853. The vessel would have been fully rigged with a total weight of approximately 1,250 tons.

Redemptora sailed under the Brazilian flag from Rio de Janeiro to Eastern Australia, arriving in Fremantle WA on the 16th October 1888. The ship was captained b Master Captain Caseveccia who led a crew of 23 men. Their cargo consisted of 233 tons sugar; 200 tons of coffee and 600 tons of ballast.

On the trip from Brazil to Australia, *Redemptora* was caught in a relentless storm that battered her severely. During the storm the vessel lost its main mast, fore top gallant mast, and had one side of its copper sheathing stripped away.

On reaching Western Australia *Redemptora* was considered uneconomical to repair and the vessel, along with its cargo, was sold by auction for a total of £2 070. The hull was then knocked down to another buyer, a Mr Lilly, for £315. Subsequently Mr Lilly used the vessel as a hulk operating out of Careening Bay, Garden Island, WA. Furthermore the *Redemtora's* bell was given to the Fremantle Fire Department on the 10th December 1928.
After serving her time as a hulk at Garden Island *Redemptora* ended her career and was laid up in Jervois Bay, Cockburn Sound about ten kilometres south of Fremantle. The vessel now lies about 25 metres from the shore in 2.9 to 4 metres of water. She lies about 300 metres south of the Alacrity wreck on a bearing of 340°.

Site History

WA Maritime Museum file: **MA File No: 10/78**

30 July 1970: Wreckage found offshore near Australian shipbuilders of South Coogee beach "There was evidence of several wrecks in a small area immediately in front of the workshop".

18 June 1971 Saturday: 'Weekend News', A group from the WA Underwater explorers club given official permission from the museum to dive on the *Redemptora*.

11 June 1973: 727/71 Trial excavation at '*Redemption*' site, this was ascertained to be un-associated with the wreck.

16 May 1971 to 5 September 1971: Underwater explorers group survey; variety of tasks completed e.g. putting in of pegs and squares.

2 February 1974: Museum staff inspected the site, recommendation that the site should be given protection.

September 2002: Museum notified that ballast had been removed from the *Redemptora* site. Museum staff went to the site to examine the extent of damage.

September-October 2002: Pre-disturbance survey, Wreck Inspection, and a detailed site plan.

January-February 2003: Ballast relocation, whereby ballast removed from the wreck was redistributed on the wreck *Redemptora*.

Personnel and Support Staff

Staff:

Ian McCloud (Conservation)

Jeremy Green

Mack McCarthy

Vicki Richards (Conservation)

Students:

Colleen Greenwell

Grant Conradie

Grant Luckman

Julie Ford

Mark Ingram

Matthew Gainsford

Susie Kennedy

Location

Jervois Bay, Cockburn Sound, opposite the Oceanfast Shipbuilding Yard.

GPS Co-ordinates: WGS 84, -32.1510833333
115.76643333333

Chart No: WA001 Lat: 32°8’44’’ S Long: 115°45’48’’ E

Sextant Angles:
A. Between light pole and right hand pile 60.05°
B. Between right pile and corner of Tenex shed 76.57°
C. Between corner of Tenex shed & Oceanfast shed 54.10°
D. Between corner Oceanfast shed and right hand Pine 53.35°

Compass Bearings:
A. Right hand pile 229°
B. Light pole at end of jetty 294°
C. To right hand pine 337°
D. Corner Tenex Shed 162°
E. Corner Oceanfast shed 162°

Transits:
1. Light pole with left side of building entrance portico.
2. Middle bollard with light pole in background.
3. Apex of shed with radio tower.

Bearing Pictures (see page after maps)

Transit Photographs (see following page from bearings)

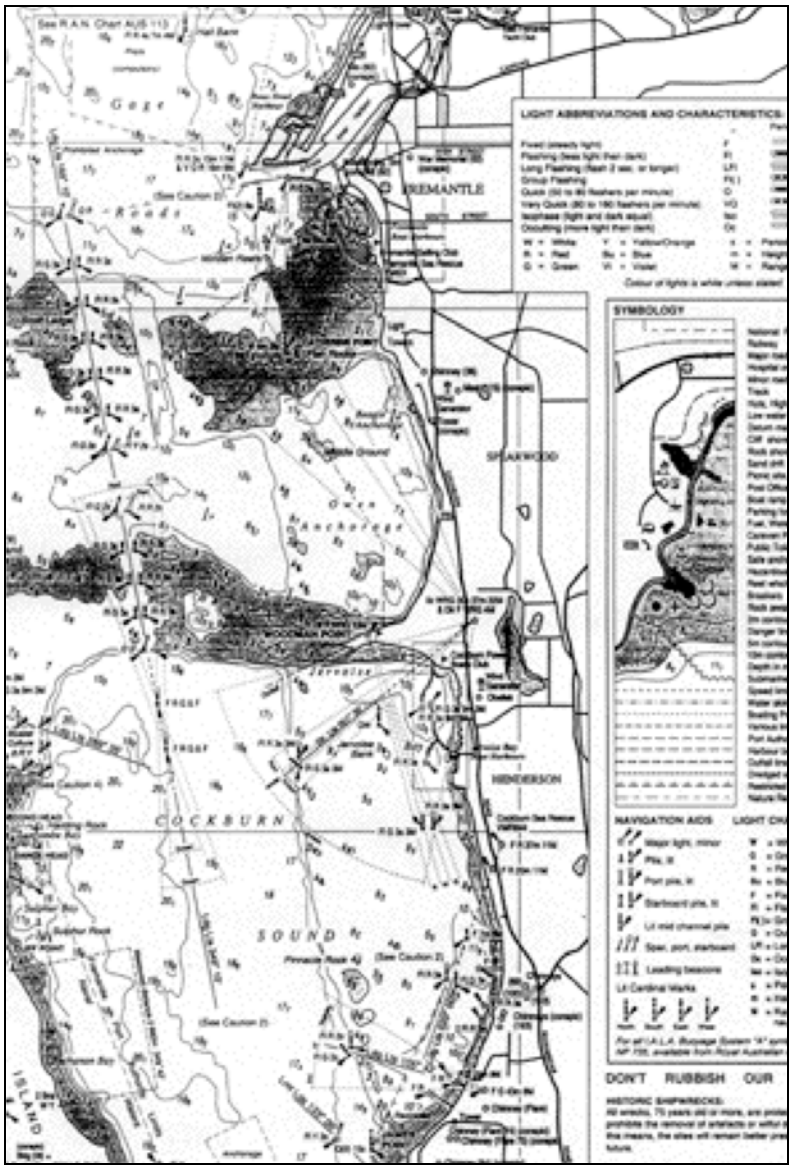


Figure 2. Map No. WA 001 Scale 1:150 000

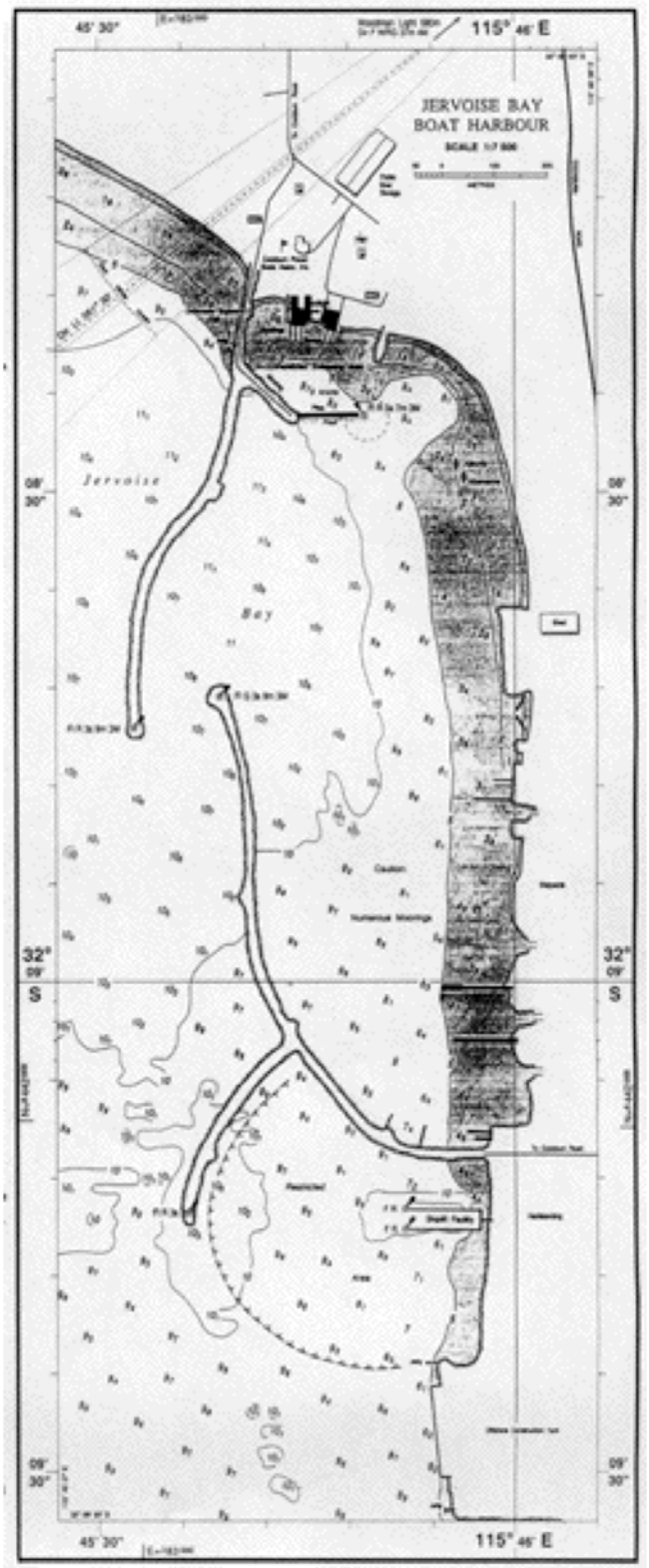
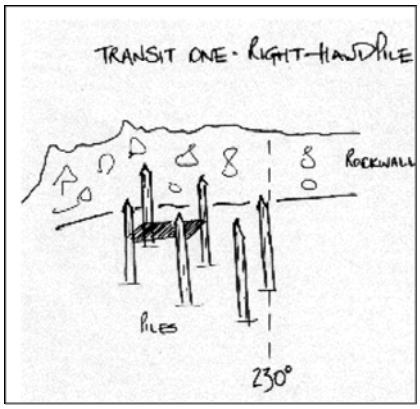
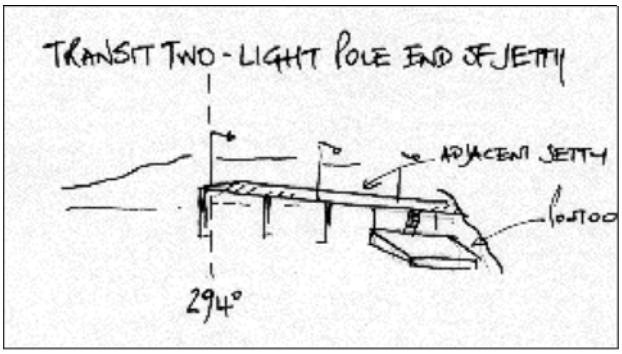
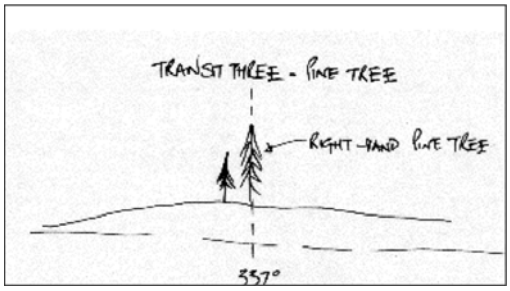
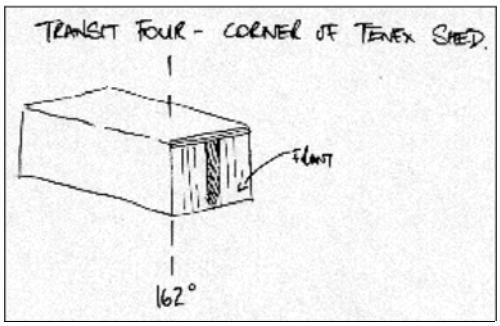


Figure 3. Map No. WA 001 (Jervoise Bay Inset) Scale 1:15 000









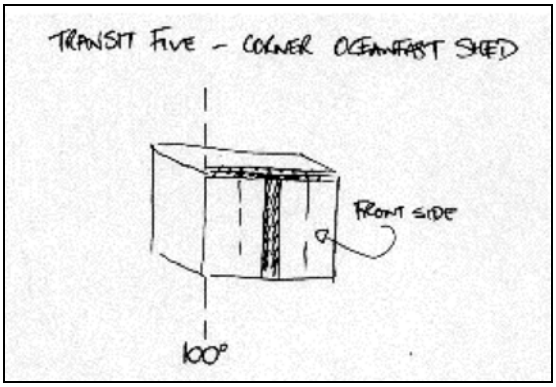
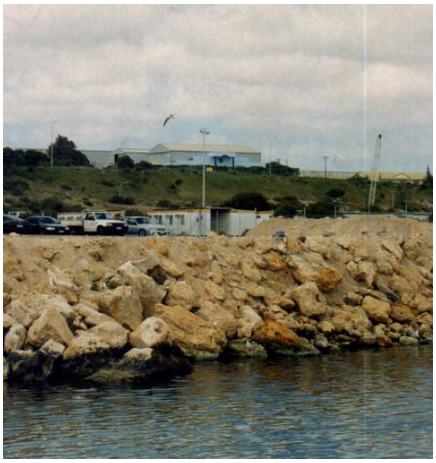


Figure 4: Bearings for the *Redemptora*, taken from the Barge.

Photographic Transits


Transit One


Transit Two


Transit Three

Figure 5: Visual Transits.

Figure 6. GPS outline of the *Redemptora* wreck site (Geo-referenced).

Site Description

Date:	06/09/02	Time: 11:00 am
Swell:	Nil	Sea: Negligible, only small chop.
Visibility:	5 metres	
Tides:	Friday 6th September; 1.05 m High@8:57am & 0.66 m High@11:26pm 0.66 m Low@12:58am & 0.43 m Low@5:04pm	
Water depth:	Shore 2.7 m; Ballast 2.25-2.15 m; Seaward 4.35 m	
Shore:	2.7 m Sea: 4.35 m Pontoon: 3.0 m Southern: 3.4 m	
Length: 45.3 m	Bearing: 150° & 330°	

Hull Construction

Wooden construction sheathed with copper. Through bolts made from Brass. No evidence of Iron. It appears that the wreck has broken off at the turn of the bilge and therefore all that survives is the hull and the turn on one side. The hull remains are; frames (running NW/SE), outer planking (running NE/SW) and stringers that run in the same direction as the outer planking.

Scantlings: Frames are the most common component of the visible remains. There are over sixty of these that are evenly spaced with a gap of around 0.07 metres between them. They are arranged so that two frames are butted up next to each other with a gap between pairs. Visible remains for each, range from, half a metre to over three metres.

Fastenings:

Keel bolts protrude from the keel along its length.

Spikes also are evident and are 0.2x 0.011x 0.011 metres in size. These have a square shaft and protrude 0.1 metres past planks.

Treenails are visible and are also evidenced by holes in the vessels timbers.

Sheathing: Copper sheathing can be seen on the seaward side of the wreck about five metres down from the ballast pile. There are also a couple more sections that can be seen, with the longest being about one and a half metres in length. Also there is copper sheathing that runs under the keel area.

Propulsion: There is no evidence for this but from archival documentation we can establish it was a sail driven vessel.

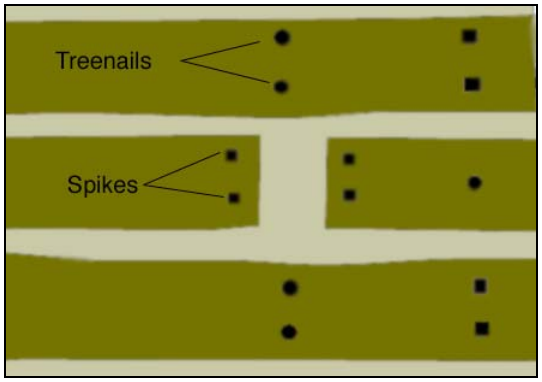


Figure 7. Sketch of some planks on the wreck.

Site Photographs

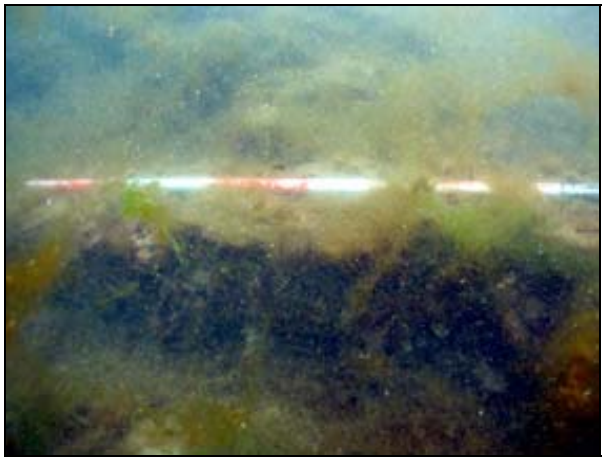


Figure 8. Side view of the frames.

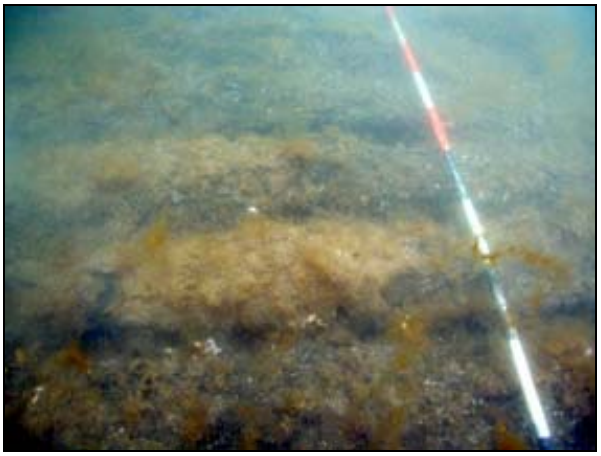


Figure9. Longitudinal view along the wreck.

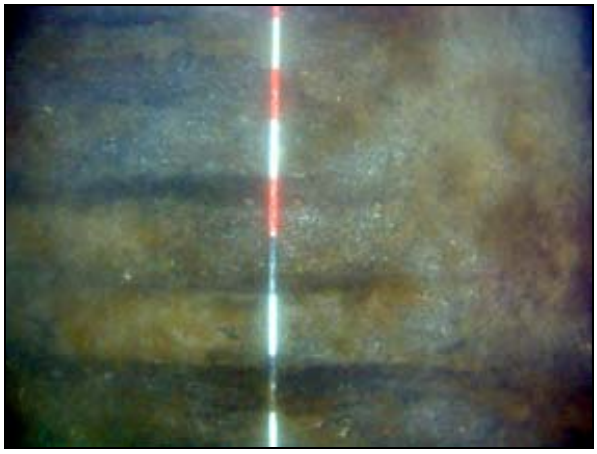


Figure 10. View of frames from above.

Figure 11. Grant Luckman measuring frames.

Figure 12. View of frames with organic detritus.

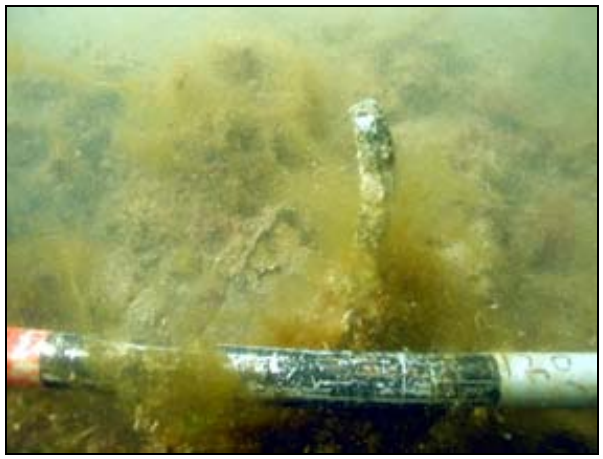


Figure 13. Spike with algae that proliferates at the site

Figure 14. More algae and organic detritus.

Figure 15. Marine life on the wreck.

Plan

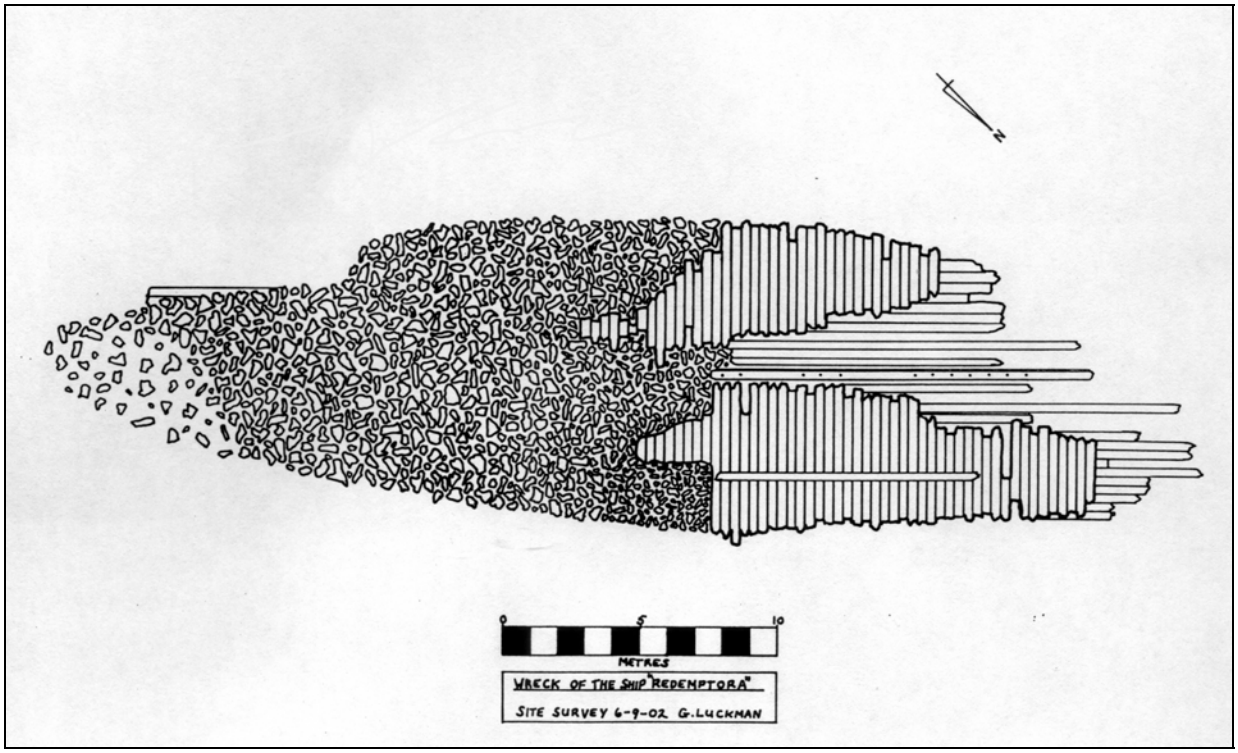


Figure 16. Plan drawing of the *Redemptora*. Drawing G .Luckman.

Site Significance

The site represents a time period in Australia's history when wooden ships were the dominant type.

Archaeological: Not many wooden ships would be in as good condition and so accessible for archaeologists in Australian waters. It offers an amazing opportunity to study a wooden ship and to gather detailed information without a lot of expense. The vessel represents a time period when although there were plans for vessels much of the information about a vessel was not recorded. The archaeological record will offer a valuable insight into the missing information about the construction of the *Redemptora*.

Management

The best method for conserving the vessel is to replace all of the ballast that has been removed from the site. This would allow sediments to build up over time creating a protective barrier from the further interference by divers and from the effects of sea life.

Recommendations

The nature of the site is such that it can easily be impinged upon. There are a number of factors, including ship movements that can influence the site. This is a common problem in Jervoise bay as there are major shipwrights on hand and since some of the ballast has been removed from the site there is an added risk of degradation. As an example Greg Normans pleasure boat is about to be launched and this will probably cause some disturbance to the site. It is recommended that action be taken to minimise any detrimental effects from occurring. In the short term it would be wise to find some way of covering the wreck. The ballast should be replaced so that the site could approach something close to its original condition. It is too costly to consider raising the wreck at this time, as this would require extensive funding which would take too much time.

HYPASS Survey:

As part of their project for the Graduate Diploma the students conducted a detailed survey of the *Redemptora* shipwreck in Jervoise Bay. The method was to use the acoustic positioning system HYPASS to delaminate the area of the shipwreck uncovered and to make a detailed plan of all timbers etc so that a two-dimensional plan could be gained. Once finished this would allow the compilers and others access to a plan that could be easily understood, was accurate and could be added to. The use of control points was a major factor in the success of this venture allowing subsequent days data to be overlayed on the previous day's data. The control points were also included in the survey allowing them to be geo-referenced and plotted on a map. The survey was conducted over six days between the 12th of September 2002 and the 8th of October 2002.

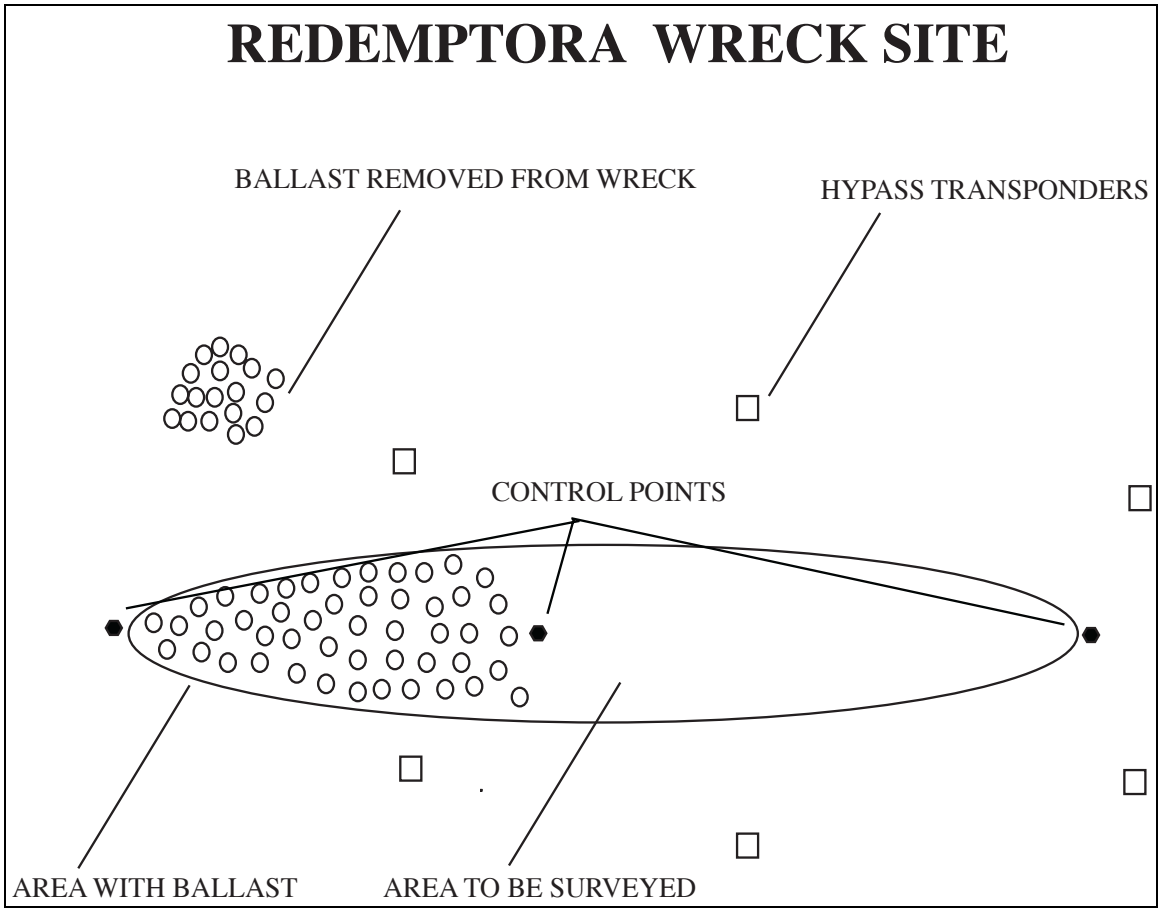


Figure 17. Layout for HYPASS surveys.

Method:
Six transponders were distributed equally around the wreck site using the WA Museum boat as a platform for this and the diving operations. Once the transponders were put into position two divers would descend and fix the position of the transponders relative to each other. Once this was accomplished the three control points would also have their

locations fixed. This procedure was repeated at the beginning of each dive and at the end of each dive.

With all the positions fixed the process of the survey could begin. Surveying in a methodical manner, the students slowly procured a two dimensional map from hundreds of fixes taken across at least twelve dives. Julie Ford then collated all the data (in site surveyor and rhino) and produced a full map of the site (below).

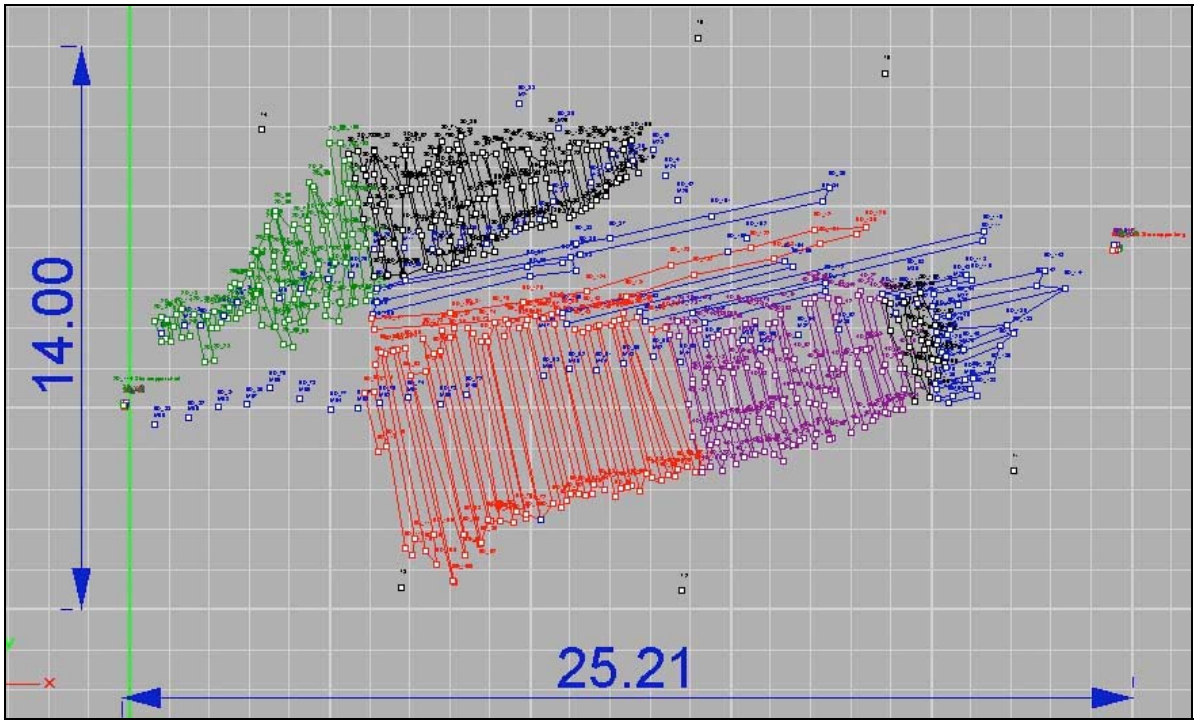


Figure 18. Rhino plot of HYPASS survey.

Ballast Replacement:

Once the survey had been completed it was important to find a way to stabilise the wreck. Because it had been partially uncovered it would degrade far more significantly than when the original ballast had been protecting it. Part of the reason for this was that the removal of ballast from the wreck had also disturbed the sediment, therefore, increasing the water and oxygen movement around the site. This would have allowed *Teredo navalis* (shipworm) to degrade the wreck; and the increased oxygen and water movement would have allowed other biological organisms to flourish. During the HPASS survey, it was noted that both of these factors had an affect upon the wreck and its immediate surroundings.

The method used for replacing the ballast involved using the boat as a working platform shifting ballast from the mound, to the wreck site. The WA Museum vessel was secured with two anchors allowing the boat to move back and forward across the site; between the ballast (to fill the crate) and the wreck (to deposit the ballast). The anchor ropes were used as transport across the site to dump the ballast.

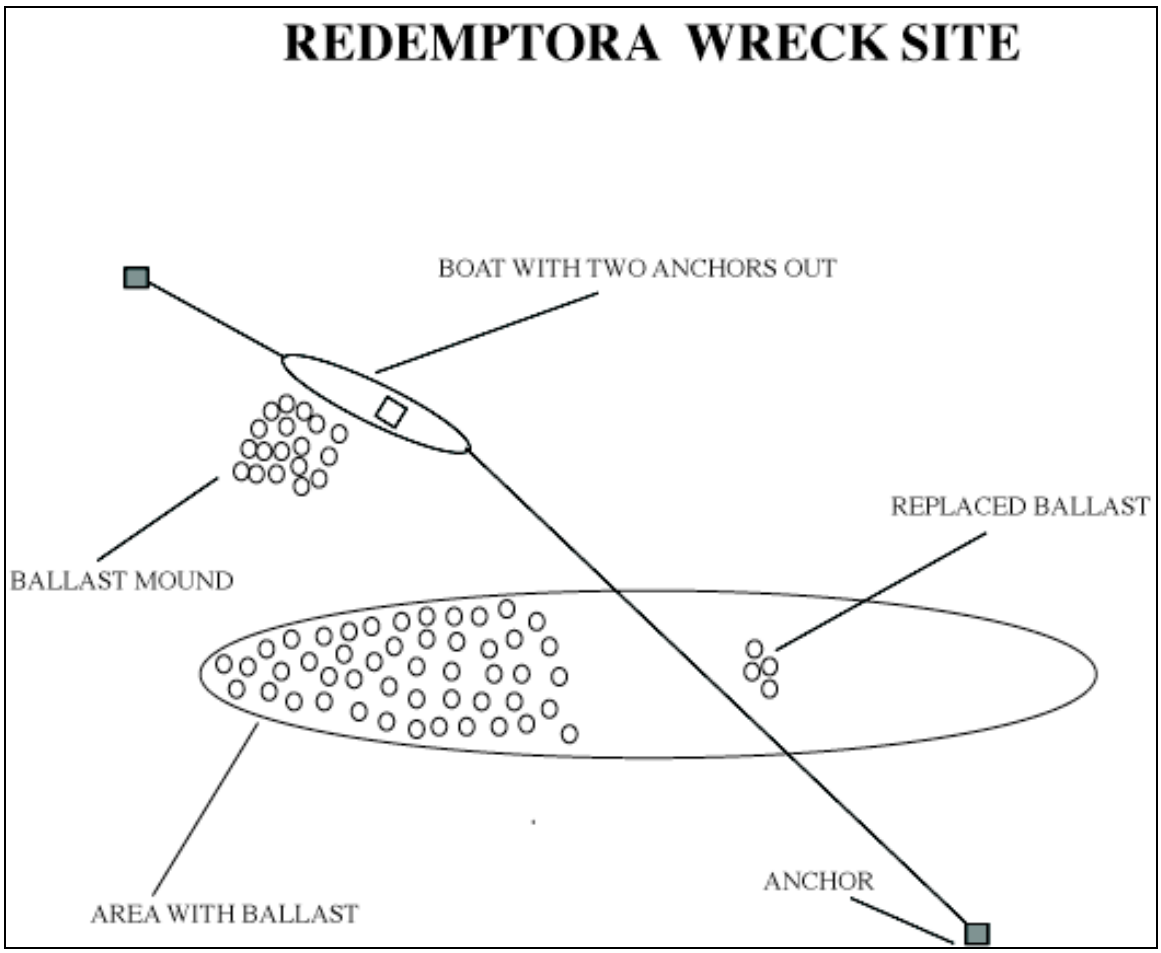


Figure 19. Shows the museum boat and the transfer of Ballast.

The crate was set up so that when it was raised full of ballast it could be easily upturned and the ballast deposited on the wreck. On both the top and bottom of the crate there were ropes from each corner that connected in the middle. At the top the conjunction of ropes was connected via a carabina clip with a rope to the davit, to raise the crate. There was a similar set-up on the crates underside that allowed the upturning of the crate. Two crates were used throughout the process of the ballast relocation. The connecting ropes to the crates from the boat had to be interchangeable above and below water allowing the filling of a crate by a diver whilst the other was being transported across the site and its contents emptied. This was accomplished by the use of carabina clips that allowed a diver to remove an empty crate and replace it with a full crate (see Figure 19).

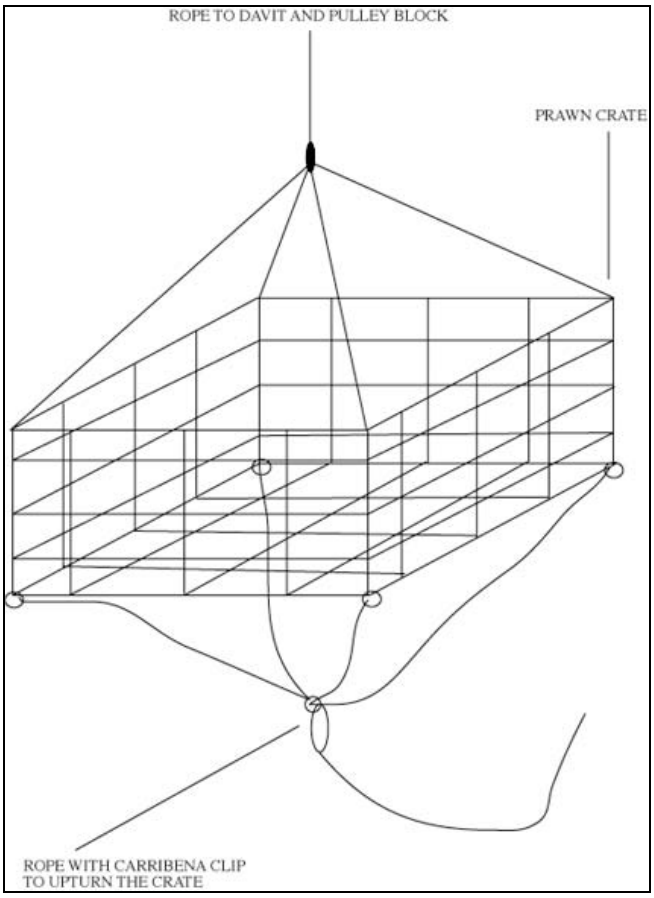


Figure 20. Crate setup.

The loading of the crate was accomplished by lowering the crate down to a diver (on SSBA breathing apparatus) who filled it with strewn ballast stones. The crate was then raised and transported to the wreck whereby the crate was upturned and the ballast deposited on the wreck. While the boat was dumping the ballast, the diver would be filling a second crate with ballast so when the boat returned, the empty crate could be removed and a full one attached. Once the first crate was down the diver would disconnect it from the ropes (via the clips) and connect the second crate. This was then raised and moved across the site. The use of SSBA allowed long dive times without a constant need for a diver to surface and swap or change tanks.

The dumping of the ballast followed the system of ropes set up for upturning the crate. Once a crate was filled the main rope was raised, and the second rope that had been loose was tightened (see Figure 20). Once across the site the main rope was released and the secondary rope (attached to the bottom of the crate) would tighten and the crate would upturn and dump its contents across the site (see Figure 21).

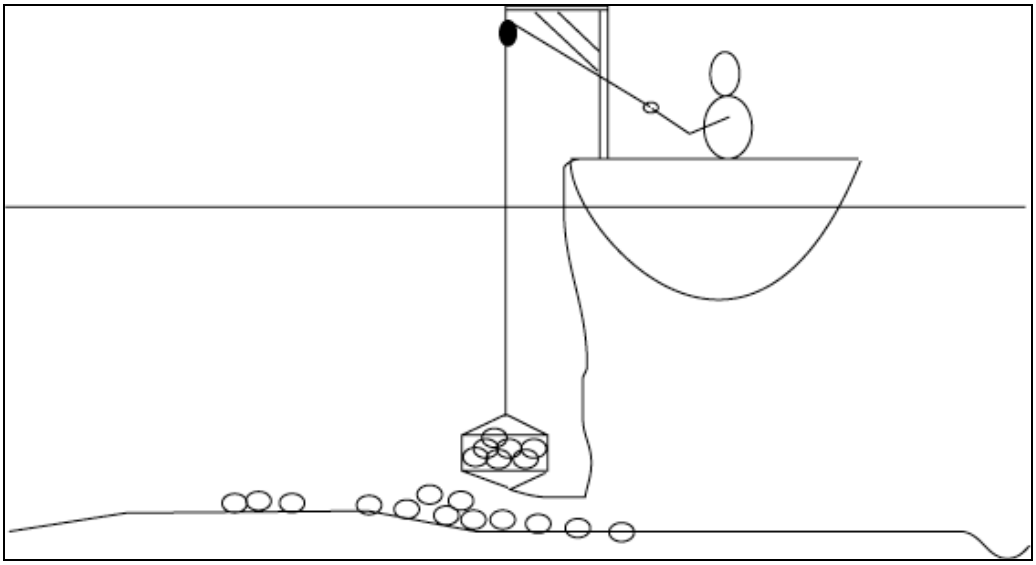


Figure 21. Loading of the crate.

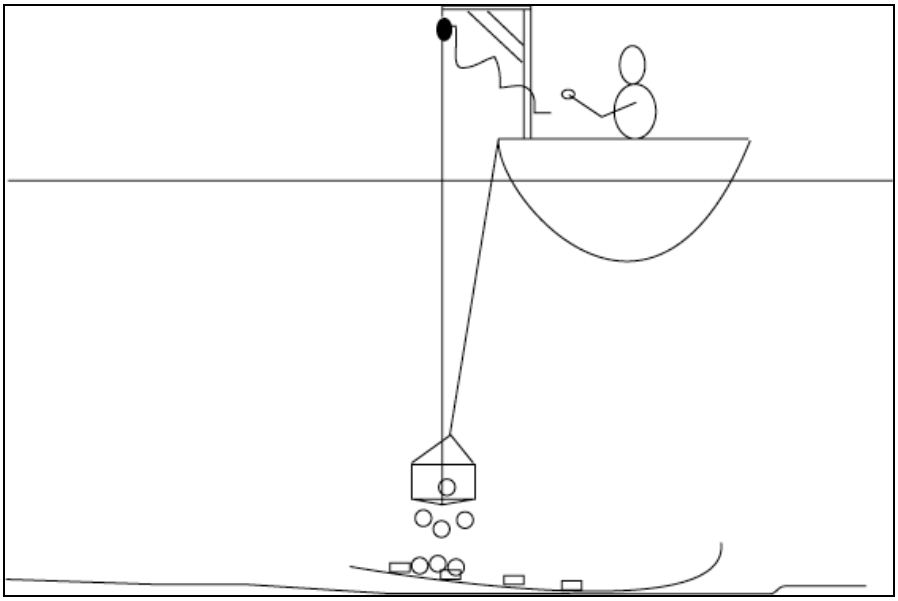


Figure 22. Emptying crate.

A record of the number of baskets/crates was kept to determine the total number dumped on the site. This allowed a look at how this was affected by wind, and the distance from the site to the ballast mound. At the start the ballast was relatively close to the site, but

once this ballast had been redistributed the diver had to look further a field for ballast stones to fill the crates. The diver was moving further and further away from the site, increasing the distance for the crew on the boat, which increased transportation times. However, a routine was settled into and although the distance increased, the time taken to complete the procedure remained about the same.

Wind was also a factor in the transportation times, as it had to be allowed for when setting the anchors. If the wind shifted, slackened or strengthened then this affected the transportation times and the location of the boat relative to the diver. The whole procedure relied on a constant wind direction and flow, with the same relative location of the diver each time, to ensure the crate could be moved quickly to and from the site and lowered directly onto the divers position for a quick turnaround. This was not always the case but if the diver was closer to the wreck with a short distance between them then the situations for error decreased.

Date	No. of Baskets	Time Taken	Baskets p/hr
21/1/03	not counted	3:05	?
22/1/03	24	2:05	11.52
30/1/03	36	3:00	12
5/2/03	18	1:40	10.8
7/2/03	26	2:25	10.75
10/2/03	36	3:00	12
12/2/03	47	3:45	12.53
13/2/03	24	2:50	8.47

Table 1. Number of baskets loaded and emptied.

Once all the crates for the day had been emptied across the site, one or more divers would go down and distribute the ballast evenly across the site. This was conducted on five out of the eight days and proved successful, as once deposited, the ballast tended to pile up in one particular area. This was a simple but very effective procedure, with dive times around half an hour per diver.

The project was a success, with the procedures being simple and easy to follow. This system could be used in a variety of situations and locations with the same sort of success that we experienced with the *Redemptora*. The major problems were; the distance from the boat to ballast as the time taken to transport ballast increases, the position of the diver remaining relatively constant, and wind direction and strength. Apart from some minor problems with these factors, the procedure was simple and the writer would recommend this method for any institution, especially as the amount of equipment required is minimal. If a similar project was to go ahead in the future, then it should be conducted with a similar set up and procedures, including the use of SSBA apparatus to reduce the need for divers to change over all the time.

APPENDIX A: PRE-DISTURBANCE DIVE TIMES

Redemptora Wreck Inspection: Dive One					
Date	Name	Apparatus	Bar Used/Bail Out	Total Time	Depth
6/9/02	G. Luckman	SCUBA	155	0:55	4.2 m
6/9/02	C. Greenwell	SCUBA	192	0:55	4.2 m
6/9/02	S. Kennedy	SCUBA	109	0:50	4.2 m
6/9/02	M. Ingram	SCUBA	220	0:50	4.2 m
6/9/02	V. Richards	SSBA	210	0:40	4.2 m
6/9/02	I. Macleod	SSBA	160		4.2 m
Redemptora Wreck Inspection: Dive Two					
Date	Name	Apparatus	Bar Used/Bail Out	Total Time	Depth
6/9/02	G. Luckman	SCUBA	220	1:55	4.2 m
6/9/02	C. Greenwell	SCUBA	220	1:35	4.2 m
6/9/02	S. Kennedy	SCUBA	210	1:48	4.2 m
6/9/02	M. Ingram	SCUBA	220	1:48	4.2 m
6/9/02	V. Richards	SSBA		1:30	4.2 m
6/9/02	I. Macleod	SSBA		1:20	4.2 m

APPENDIX B: PRE-DISTURBANCE RESULTS

Probe Depths:

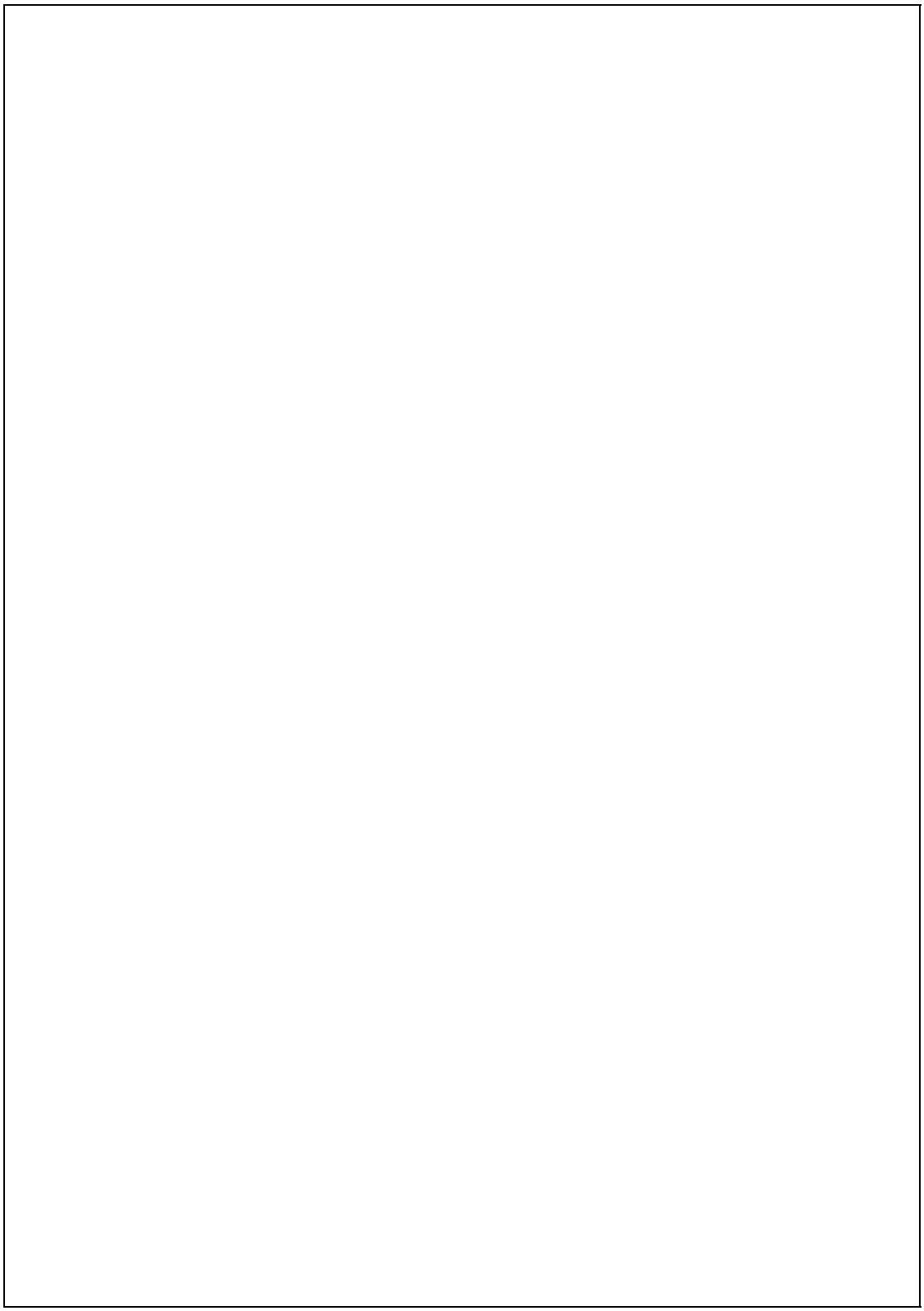
REDEMPTORA				
Date Inspection	**21/8/02**			
Description	**Position**	**Material Type**	**Depth of Probe Penetration (mm)**	**Observations/Comments**
frame	midships near 3 buoys	wood	<1mm @ 5mm intervals	
plank	midships elevated lying parallel with keel	wood	<1mm @ 5mm intervals	
frame	outer buoy (stern?)	wood	~25mm @ 5mm intervals	
fastening	outer buoy (stern?) near frame	copper alloy	1mm thick Cu2O layer/5mm total corrosion product layer	aerobic corrosion products on surface, quite corroded
end timber	outer buoy (stern?)	wood	5mm - 15mm @ 5mm intervals	
planking	outer buoy (stern?)	wood	25-50mm @ 5mm intervals	extensive biological degradation
planking	far side (stbd?) midships near 1st buoy towards bow 2nd plank in	wood	20mm @ 5mm intervals	extensive biological degradation
fastening	far side (stbd?) midships near 1st buoy towards bow 2nd plank in	copper alloy	15mm corrosion product layer	aerobic corrosion products Cu2(OH)3Cl & Cu2O fastening was originally 20-25mm in diameter (5-10mm diameter remaining)

General Parameters:

REDEMPTORA	
Date Inspection	**6/9/02**
Parameter	**Measurement**
BOX 1 (IDM) E ref	0.251V
Water depth for pH & E redox measurements	2.9m
Temperature @ 2.9m water depth	16
pH seawater	8.14
Eredox seawater	0.044V
pH sediment @ 40mm sediment depth	7.62
Eredox sediment @ 85mm sediment depth	-0.250V

Temperature, Salinity and Dissolved Oxygen:

REDEMPTORA				
Date Inspection	**6/9/02**			
Log Number	**Water Depth (m)**	**Dissolved Oxygen (ppmS)**	**Salinity (ppK)**	**Temperature ©**
53	0	4.91	35.2	17.3
54	1	6.27	35.4	16.6
55	2	8.25	35.5	16.2
56	3	8.11	35.8	16.1
57	4	8.52	35.9	16
58	5	8.36	35.9	16
59	5	8.6	35.9	16



pH Profiles:

REDEMPTORA									
Date Inspection		**6/9/02**							
Timber Description	**Position**	**Baseline Position (x co-ord)**	**Offset from Baseline (y co-ord)**	**Position on Timber of Core Hole**	**Core Depth (mm)**	**pH**	**Water Depth**	**Sample Number**	**Comments**
inner planking (ceiling?)	midships elevated lying parallel with keel	17.90m	2.25m	10.3m forward of timber end	0	7.86	3.1	saw sample bag 13	(see Probe Depths Worksheet for average probe depths 21/8/02)
					15	7.94			2-5mm probe depth 6/9/02
					30	7.76			extensive internal deterioration by teredo
					50	7.36(decr)			plank 100mm thick
					55	7.49(decr)			see underwater sheets for diagrams of sampling and coring
					80	7.6			
					100	6.50 (inner surface)			pH electrode inverted accuracy questionable
								end of plank fell off	

frame	last frame near outer buoy (stern?)	4.1	2m	1.26m from stbd end of frame/0.75m from port end of frame	0	7.86	3.8	3 x saw sample/ 12 outer, 11 mid, 10 inner	2-5mm probe depth
					25	7.01			relatively good condition
					8	6.76			see underwater sheet for diagrams of sampling and coring
					110	6.24			

Corrosion Potentials:

Date Inspection	6/9/02				
BOX 1 (IDM) E ref	0.251V				
Copper Alloy	**Position**	**Ecorr rel AgCl ref**	**Ecorr rel. NHE**	**pH**	**Comments**
pipe (?)	midships slightly aft of three buoys LHS wreck (stbd?) when facing outer buoy (stern?)	-0.163	0.088	Note: pH electrode was 'poisoned' on-site due to seaweed and organic detritus in the water column due to the physical cleaning of the wreck	
fastening 1	stbd side towards outer buoy (stern?) aft of pipe	-0.267	-0.016		
fastening 2	stbd side forward of fastening 1	-0.264	-0.013		secondary marine growth, barnacles, mussels, seaweed
fastening 3	stbd side forward of fastening 2	-0.23	0.021		1mm corrosion product layer
fastening 4	near fastening 3	-0.144	0.107		
fastening 5	more stbd of fastening 4				thin fastening extensively corroded apparent necking at wood/copper fastening interface

	head of fastening	-0.144	0.107		
	mid shank	-0.144	0.107		
	necking area adjacent to wood	-0.141	0.11		

APPENDIX C: BALLAST REPLACEMENT DIVE TIMES

DATE	DIVERS	DIVE MEDIUM	TIME IN	TIME OUT	TOTAL
21/1/03	JEREMY	SCUBA	9:20	9:40	0:20
	"	SSBA	9:45	11:40	1:55
	MACK	SSBA	11:50	1:00	1:10
22/1/03	MATT	SCUBA	8:40	8:56	0:16
	JEREMY	SSBA	9:00	11:05	2:05
30/1/03	JEREMY	SSBA	8:57	11:57	3:00
5/2/03	JEREMY	SSBA	8:50	10:30	1:40
	MATT	SCUBA	10:48	11:18	0:30
	COLLEEN	SCUBA	10:48	11:18	0:30
7/2/02	JEREMY	SSBA	9:25	11:50	2:25
	MATT	SCUBA	11:55	12:44	0:49
	COLLEEN	SCUBA	12:05	12:25	0:20
10/2/03	JEREMY	SSBA	9:00	12:00	3:00
	MATT	SCUBA	12:15	12:45	0:30
	COLLEEN	SCUBA	12:20	12:45	0:25
12/2/03	JEREMY	SSBA	9:00	11:05	2:05
	GEOFF	SSBA	11:20	1:00	1:40
13/2/03	JEREMY	SSBA	8:55	11:45	2:50
	MATT	SCUBA	12:00	12:38	0:38
	COLLEEN	SCUBA	12:07	12:39	0:32
	GEOFF	SSBA	12:05	12:30	0:25
				TOTAL TIME	

References

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WA Chart No. WA001.

WA Maritime Museum, File No. 10/78