Alcoa Jetty Wreck Survey Report 2005

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Report—Department of Maritime Archaeology
Western Australian Museum, No. 211
2005

Introduction

This report concerns a survey carried out on what is known as the Alcoa Jetty Wreck. The survey took place between the dates of 26 April to 18 May, 2005. The primary goal was to produce a survey plan that updates a previous survey carried out in 1987 (See below). Secondary goals were to attempt a more positive identification of the wreck through the use of historical documents and analysis of the material remains. The outcomes were to be able to provide a report on the nature of the site for use by future researchers, as well as a subsequent article for publication in a journal and to provide a report of a sufficient standard to complete the second stage of a Nautical Archaeology Society training program.

Figure 1. Map of Cockburn Sound showing *Camilla* and other sites in area.

Initial conception

The initial conception for the survey arose from a discussion between the survey director and Jeremy Green of the Western Australian Maritime Museum during a conference in Berlin. As a student it was necessary for the author to complete a required number of days of field work, in order to complete the degree. When approached, Jeremy Green said that occasionally students come to the museum in Western Australia and carry out work for then on a volunteer basis. From the work a report to go to publication is expected.

After subsequent correspondence, those working at the museum decided that the Alcoa Jetty Wreck would be suitable to meet the requirements of the both the museum and the abilities of the author. It was important to the museum to have an updated survey, because a detailed report had not been attempted for twenty years. A survey of the wrecks in the vicinity had occurred previously but this particular wreck had not been examined in more depth because it lay outside of the areas under investigation for development (reference). Subsequent to the survey being carried out it has since been revealed that developers have requested a report be produced. It is hoped that this current survey report shall be considered sufficient to meet these ends.

Site location

The site of the wreck is approximately 15 km south of Fremantle, the port for Western Australia's capital city of Perth. The location is in the Jervoise Bay section of Cockburn Sound, approximately half way down and across from Garden Island. More precisely, the wreck is 200 metres north of the Alcoa Jetty, and 70 metres from shore (Figure 1). The orientation is having it lie with bow towards the shore on an almost directly east-west position. Global Positioning readings were taken with total stations set up on shore, with the measuring rod held aloft by a diver. The results were a number of very precise readings as follows (Figure 2).

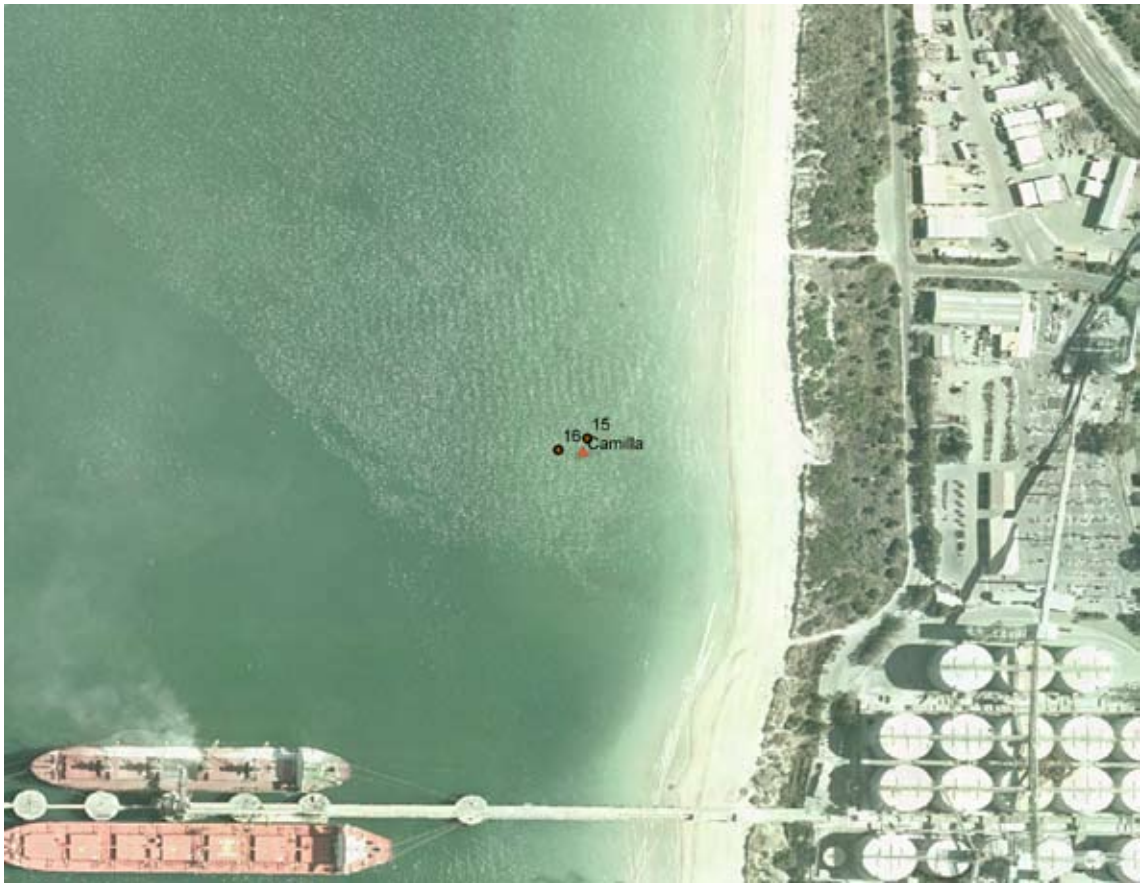

Figure 2. Survey of *Camilla* wreck site.
#15 S 32.18642931 E 115.77554114 #16 S 32.18636053 E 115.77571365

Previous surveys

There have been a number of examinations of the Alcoa Jetty wreck previously, ranging from a cursory mention to a detailed description. The first mention is in the AIMA bulletin in 1986 of Mike Pollard's discovery of the site. The next mention is in Mike McCarthy's investigation of the wrecks of Jervoise Bay. Here there is a tentative identification of the wreck as being the *Camilla*. This subject shall be discussed in greater depth later in the report.

The most recent investigation of the wreck took place in 1987 entitled 'Survey and possible identification of a colonial wreck in Cockburn Sound'. Being undertaken by several students the report consists of five pages of text, several maps and a survey plan. There are descriptions of site features, survey methodology, pre-recording activities and recording and conservation methodologies. Additionally, there is a description of the life-history of *Camilla*, a likely candidate for identification of the vessel. There is also a description and dimensions of the physical remains resting on the seabed..

Available resources for the project

The 2005 survey project was deemed to be separate from the activities of the Western Australian Maritime Museum, though with the understanding that resources needed would be made available. Office space and equipment within the shipwreck galleries were made available. This included computers, photocopier machine, telephone, presentation equipment and so on. Much of the survey and diving equipment for the author was made available from the work sheds.

Arrangements were made to have volunteers made available for the project. These came predominantly from the Maritime Archaeology Association of Western Australia, some having a little previous underwater archaeology training. Additional personnel were staff from the Maritime Museum, when available. The volunteers were to provide their own equipment and transport. Occasionally we would have the use of a small boat from one of the volunteers.

Survey strategies

Site conditions

During a calm day the wreck can be seen quite clearly as a dark patch from the beach. Under the same conditions many of the details of the wrecks shape can be made out from the deck of a vessel over the site. The site is approximately 3 m deep.

The survey took place at time of the year where the weather was turning. Even over the short period of three and a half weeks the work took place a change in the weather was seen. Storms began to occur, although fortunately they occurred outside of the dive periods. On the whole, the weather conditions had limited impact on the site area because of the location being in the sound, which was protected by the brunt of the Indian Ocean by Garden Island. Visibility on the site ranged from mainly very good to poor after sediment had been kicked up after bad weather the night before. In addition, visibility may have been hampered by sediment stirred up by the activities of the shipping near the jetty (reference).

The wreck lies on bare sand, with very few natural features in the vicinity. There is a very slight slope that means that the west end is slightly deeper than the east end. The wreck itself stands proud of the seabed at an average height of half a metre. The majority of the material is made up of timbers and iron knees, which have been fused together with concretions. As this was a non-intrusive survey, no investigation beneath the concretions was carried out. The bulk of the wreck concretions are surrounded by debris, being made up of iron knees and timbers.

Setting up the control network

It was decided that the survey strategy would involve the use of a computer underwater survey program called site surveyor. This would result in having a number of points drawn where the subsequent drawings would be able to be laid over the top. Site Surveyor calls for firstly an array of surrounding points to be measured to each other. This allows a control network to be set up, from which the artifacts would subsequently be measured.

The control network began with the placement of a baseline down the centre of the majority of the wreck. The baseline was in the form of two pickets with a measuring tape strung between them. From the base line the rest of the control network was placed by hammering in further pickets. Each picket was given a designation and measurements recorded in between them. Site Surveyor demands a certain number of measurements to each, and angles to fall within a specific range. This was taken into account in the planning stage (Figure 3).

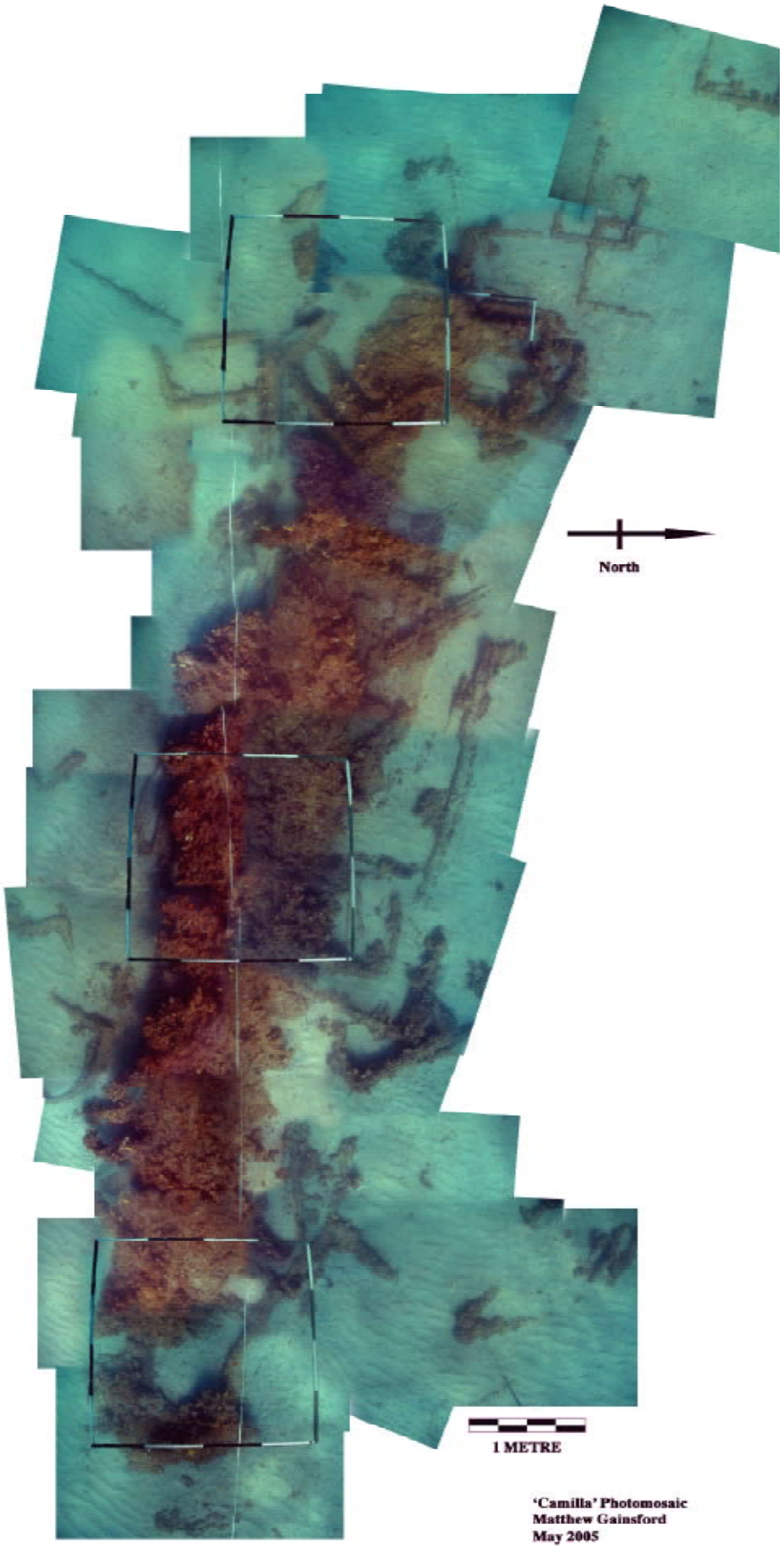

Figure 4. Photomosaic of wreck site.

Photomosaic and identifying the targets

During the initial dives one of the team members hovered over site with a camera, thus enabling a photomosaic of the site to be produced (Figure 4). The production of this photomosaic at such an early stage in the survey allowed for it to be included directly and instantly into the survey strategy. This proved to be invaluable to the process of the selection of targets to be measured.

It was deemed by the author that it was important to keep in mind certain notions while constructing the survey strategy. This was namely to expect that unforeseen events, such as the weather may intervene and stop the survey prematurely. With this in mind it was thought for the best to go from the 'coarse grain' to the 'fine grain'. In the case of target selection, the outlying debris would be measured first, then the limits of the wreck itself second to that. This would also give the opportunity to test different ways of physically surveying and enacting changes on this where need be.

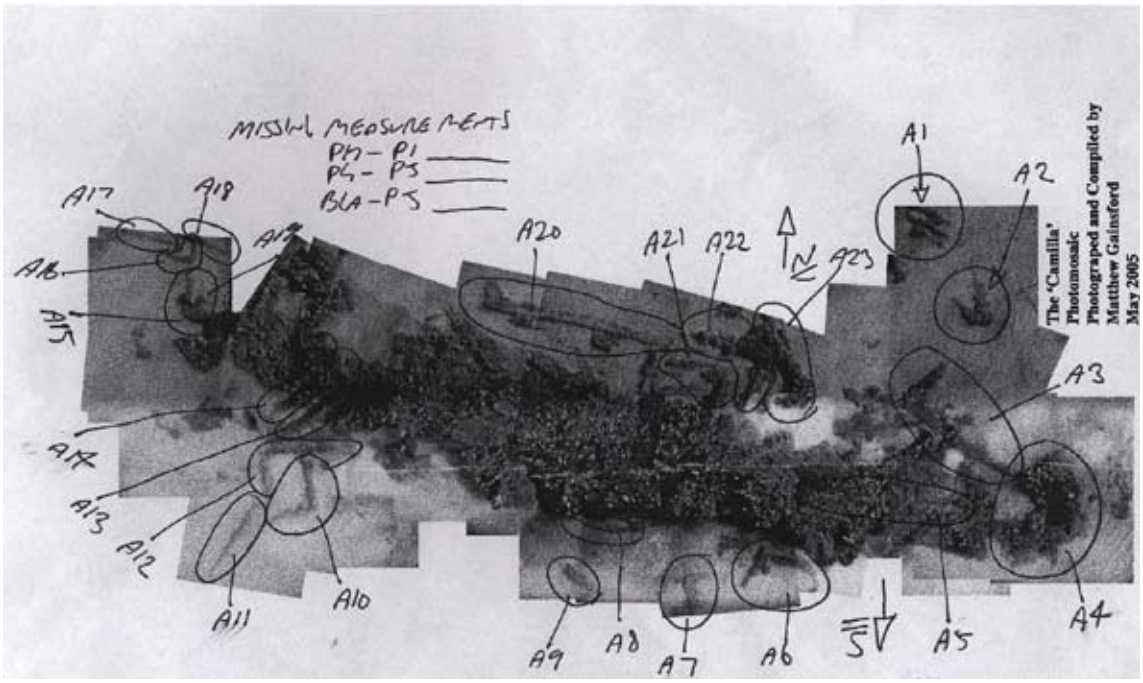

Figure 5. Artefact targeting

From the photomosaic a number of debris artefacts were designated (Figure 5). These shapes were isolated and transferred to two boards, to enable two teams to work simultaneously. In the main the extremities for each of the artifacts were chosen as measuring points. Added to the board were table of the measurements to be taken from the various control points. Again, the angles were taken into account as demanded by the Site Surveyor program. Enough measurements were included to account for redundancy, providing some backup in the event of errors being made (Figure 6).

Dives and teams

The activities envisaged for the teams to carryout were mainly that of hammering in the pickets, measuring and recording the distances between the control points and the artifacts and drawing. The drawing would happening in the final stages of the survey, after the points were entered into the Site Surveyor program.

With these activities in mind, the bulk of the work required two teams to operate on the weekends, and preparation work to be carried out during the week with whatever personnel

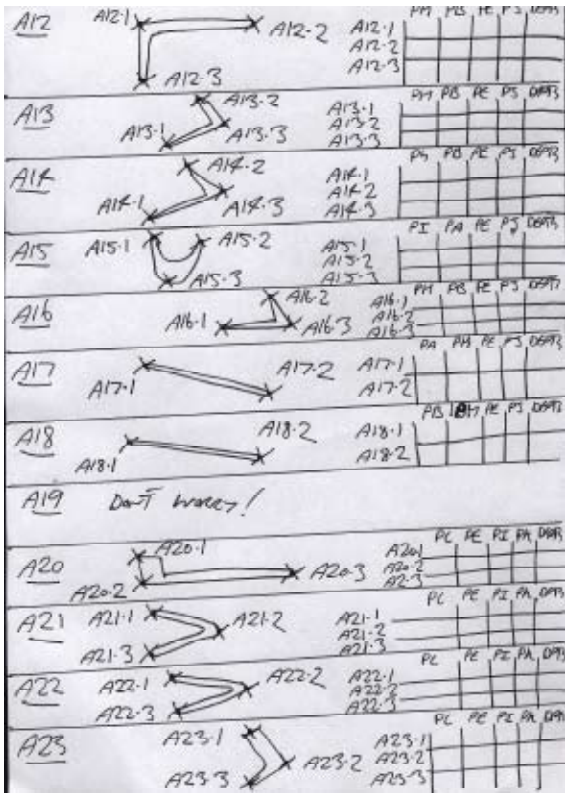

Figure 6. Eample of diving board notes.

may be available. This meant that the amount of divers available varied between two to six or more. The measuring activities required two teams, made up of three divers each. The different roles of each team member came to be thought of by different terms. These were the ‘pole sitter’, the ‘pointer’ and the ‘juggler’ (Figures 7 & 8).

Figure 7. ‘Pole sitting’
(Photos courtesy of Joel Gilman).

Figure 8. ‘Pointing and juggling’

The pole sitter: This person’s role was to stay with a control point, designated by the pointer. They were to keep the measuring tape fastened tight to the top of the picket while the measuring was being carried out.Photo courtesy of Joel Gilman
The pointer: The role of the pointer was to carry the board about and point to the juggler the next part of an artefact to be measured. They would then observe the measurement and write it on the board, before directing the team to the next required point.
The juggler: The role of the juggler was to carry the end of the measuring tape and take it to the point to be measured, as indicated by the pointer. In most cases a metre long pole was also carried about and placed at the point. This allowed for the tape to remain as

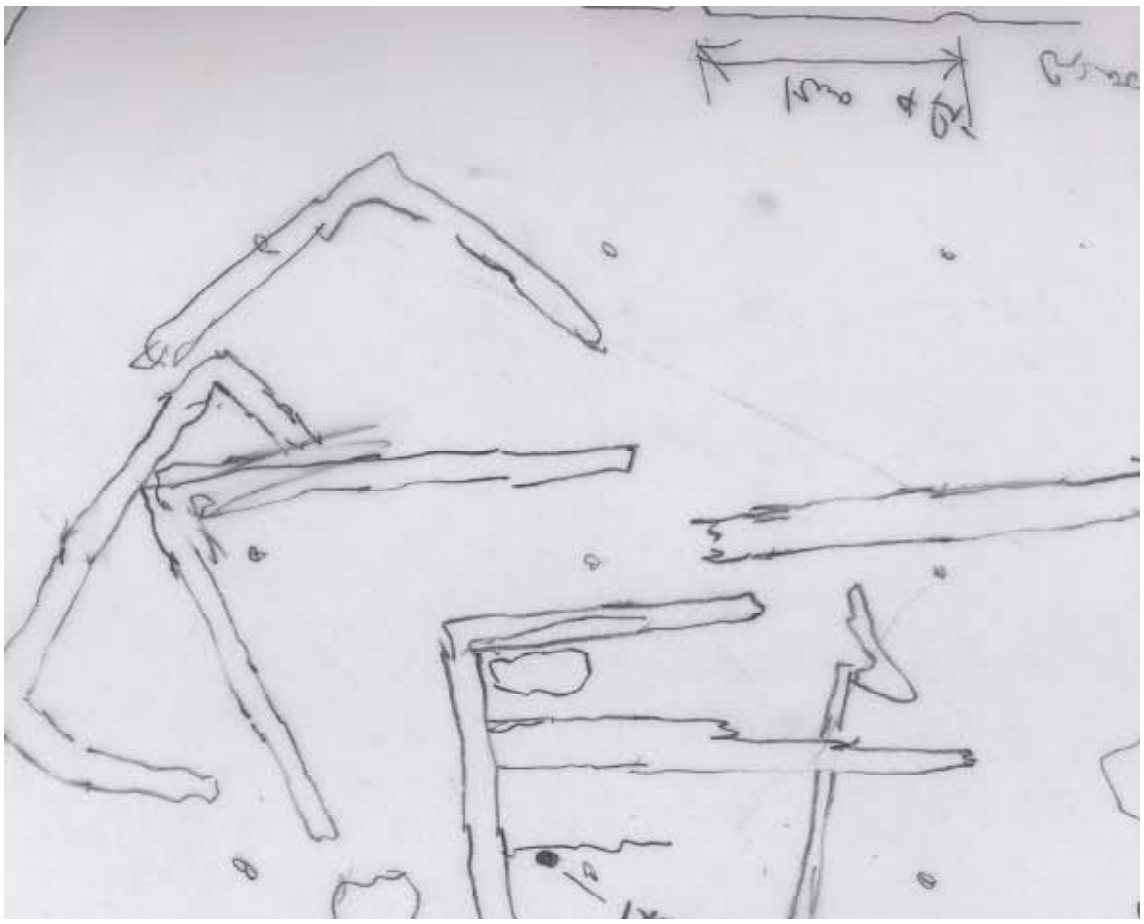

Figure 9. Example of drawing (C. Cockram).

horizontal as possible in relation to the control point, and also be able to clear the bulk of the wreck if required.

Drawing and photography

Those divers most confident were given the task of drawing during the last weekend of survey. Unfortunately, the weather had begun to change for the worse by that stage, and the winds were creating a surge at the location. This made the task of drawing a little more difficult and the visibility poorer than usual. However, the drawings were completed to a satisfactory level under these conditions (Figure 9).

It was decided that the drawers would be designated areas, on either side of the base line and working outwards. They were each given a metre square to work from, which they moved end over end when required. The drawings were completed over the last two days of diving.

In addition to the drawing, many photographs and some video were taken by the Maritime Museum photographer Patrick Baker. By utilising a dual camera array, he was able to produce a good number of stereoscopic photographs of the wreck material. When examined through a viewer, this enabled some very fine details of the materials to be seen. This may be very useful at a later point when a more fine analysis of the archaeology is planned for publication.

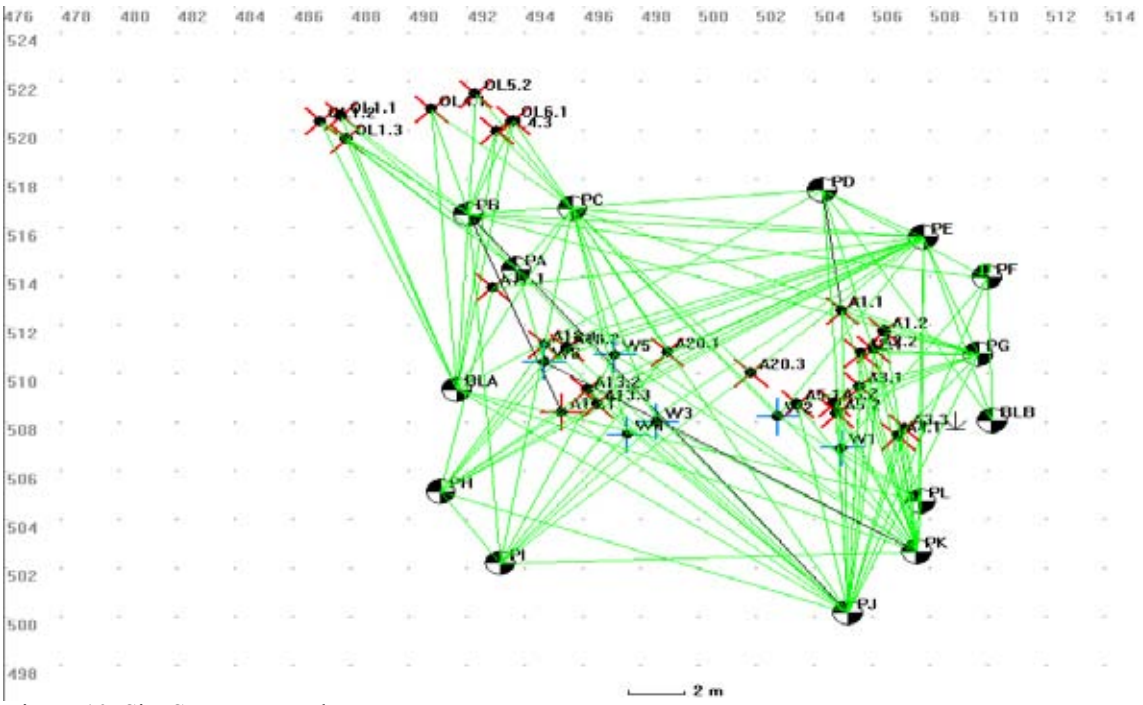

Figure 10. Site Surveyor results.

Survey results

Plan strategy

A strategy was required to produce an accurate and useful site plan. The concept was to use the points portrayed in site surveyor to layer the scanned drawings over the top using Photoshop. Additionally the photomosaic would also be added as a layer enabling comparisons to be made between all three formats. Once a satisfactory result was produced then this would be printed as a hardcopy.

Site Surveyor results

Once all of the measurements were gathered together they were entered into the Site Surveyor program (figure ten). At this stage the advantages of having so many measurements became apparent. Although many of the measurements and so corresponding angles were accepted, many were not and had to be discarded. However, through this process of enabled redundancy, there were enough accepted results to make out the perimeter of the wreck itself, and much of the surrounding debris.

There was a collection of iron knees that lay to the immediate north-west of the wreck site and that lay outside of the photomosaic. This outlying collection had been measured and drawn and so was able to be added to the site plan.

Digitising the drawing and merging

The results from the Site Surveyor plan was utilised as the foundation of the plan in Photoshop. The drawings supplied by the divers were scanned and cleaned up. Before they were added, the photomosaic was added as a layer. The perimeter of the wreck matched well with the corresponding Site Surveyor points. However, there were clearly some problems with a number of the outlying debris.

The drawings were then layered on. Again, there were clear matches and a number of discrepancies. Each format i.e. Site Surveyor points, drawings and photomosaic demonstrated their own strengths and weaknesses. The Site Surveyor points was good at showing orientation, but showed difficulties in some places with scale. The photomosaic, perhaps regarded as the ‘nearest fit to reality’ nonetheless demonstrated some distortion caused by the camera lens. The drawings demonstrated good accuracy in the main and

highlighted characteristics missed by the photomosaic, though demonstrated some problems with orientation.
It can be seen that the strengths and weaknesses for each can be taken into account through comparisons by the person compiling the site plan. Judgement made by using reasonable guesses was able to produce a satisfactory degree of accuracy. There was one issue with the end result showing only the planks and iron knees, with none of the concretion depicted. This problem was solved by isolating the concretions that holds the bulk of the material together in the photomosaic. This image was then manipulated using the photocopy tool on Photoshop. The result was an accurate, photorealistic image on the concretions that gives a good impression as to how the site actually appears.

Historical research

Most likely Ball's lighter and 1834 *Camilla*

During the three and a half survey period some time was also spent in historical research in the hopes of improving the chance for the positive identification of the Alcoa Jetty wreck. The first step was to go over the documents of the previous surveys and assessments. With this data it was hoped to track down the primary documents and hopefully add more through library research. The ultimate goal was two-fold; firstly to gather the primary documents in one place to assist future researchers on the wreck, and secondly to provide more information that may be compared against the physical remains.
To return to the previous survey, it states that in 1981, Mike McCarthy had tentatively identified the wreck as being *Camilla*. According to the Fremantle Harbour Trust Records, this was a lighter that operated in Fremantle Harbour sometime after 1897. In 1903 she was ordered by the authorities to be disposed of, so her fate was to be beached 'beyond Woodman's Point' (Fremantle Harbour Trust Records 1903). Woodman's Point is the piece of land that juts out between Fremantle and the Alcoa Jetty (see Maps). McCarthy sent parts of the timbers of to the C.S. I. R. O. for analysis, which showed that the vessel was to likely to have built in Europe, and underwent repairs in Australia or New Zealand (McCarthy, Jervoise Bay Shipwrecks, 1981).
McCarthy then turned to the Lloyds Registry and found the closest fit being a *Camilla* built in Leith, near Edinburgh in 1834. The vessel's life history can be traced through seventy years in the registry (appendices). *Camilla* is declared a hulk in 1892 and owned by the Orient Steam Navigation Company, a company that operated out of the Western Australian port of Albany. It may be that she was then sold on to become Ball's lighter in Fremantle (McCarthy, Jervoise Bay Shipwrecks, 1981). It should be stated that there is no documentation to connect the two vessels as of yet.
The 1987 survey report gives a detailed description of *Camilla*'s life history and is sufficient in its length not to be repeated here. There are a number of details however that are of enough interest to add to this discussion. Recently, an interested party in Scotland has come across a possible image of the 1834 *Camilla* (see cover). Found amongst a collection held by the Library of Tasmania the image is a painting of the 'Schooner *Camilla*', for a postcard in the early 1900's. The rigging of the ship is actually configured as a brigantine, which fits the history of the ship as undergoing a change of rig when she was sold to the Bank of Van Dieman's Land in 1890.
Turning to correspondence between Mike McCarthy and the Bureau of Customs in Tasmania, there seems to be a number of discrepancies with the illustration as being the same vessel. Their records describe the rigging as schooner and the ship to have a woman's bust, the latter not being apparent in the illustration. It may be that the rigging description may have either been recorded before the change, or perhaps was taken from earlier records.

Conclusion

The primary goals of the Alcoa Jetty Wreck Survey for 2005 have been achieved. This is namely that a updated survey plan has been produced. Additionally, primary documents have been all gathered together in one place. It is hoped that these two things together, will produce a starting point that is sufficient enough for future interested researchers to be able to quickly understand the work that has taken place on the site previously. In this way time will be saved in having to go back over ground that has already been covered.

There are a number of suggested avenues that may be taken as examples of where this future research may begin. One is the locate the elusive scarf joint of the keel. The measuring of the joint may reveal a better approximation of the vessels tonnage.

Additionally, it is this authors intention to investigate the possibilities of analysing pollen that may be recovered from the caulking. If it can be demonstrated that the ship underwent caulking in Scotland, this would provide strong evidence that the ship is indeed the 1834 *Camilla*.

On the historical side, there is one obvious approach apart from matching the physical remains to the historical documents. Is the delving into the archives to see if there is a more positive link that identifies the 1834 *Camilla* with Ball's lighter. Perhaps this can be done with an examination of documents pertaining to activities in the port of Albany.

Acknowledgements

A very special thankyou goes to those who helped out on this project, without whom it would have been impossible to complete. Staff of the Western Australian Maritime Museum: Jeremy Green, Mike McCarthy, Matthew Gainsford, Jennifer Rodreques, Michael Gregg, Richenda Prall, Karli Kasi and Patrick Baker; Members of the Martime Archaeology Association of Western Australia: Joel Gilman, Aiden Ash, Graham Dey, Don Alexander, Peter Newitt, Ian McCann, Cole Cockram, Clive Tolley, Sandy (?); Institute of Archaeology, University College London: Stuart Laidlow; British researchers: Jon Justice, Scots (?).

References

Bureau Veritas-Llgud, 1865, *Universal Register Requirements 1865*, Clearwater Publishing Company, New York.

Butlin, S.J., 1953, *The Foundations of the Australian Monetary System 1788–1851*. Sydney University Press, Sydney.

De Kerchove, R., 1961, *International Maritime Dictionary*. Van Nostrand, New York.

Falconer, W., 1780, *Universal Dictionary of the Marine*. Reprinted Library Editions 1970, New York.

Hundley, P. and Stanbury, Eds. 1986, Maritime Archaeological Association Western Australia. Five year report. Bulletin of the Australian Institute for Maritime Archaeology, 10(1).

Kemp, P., 1976, *Oxford Companion to Ships and the Sea*. Oxford University Press, London.

Lloyds Register

McCarthy, M., 1981 Jervoise Bay: a case study in the management of endangered wreck sites, *International Journal of Nautical Archaeology*, 10(3): 239–253.

Paasch, H., 1890, *Illustrated Marine Encyclopaedia*. Reprinted by Argus Books, England.

Parsons, R., 1973, *Steamships in Colonial Western Australia*. R. Parsons, Murray Bridge,

Staniforth, M., 1985, The introduction and use of copper sheathing: a history. *Bulletin of the Australian Institute for Maritime Archaeology*, 9: 21–46.

Appendix 1 Copy of report on *Camilla.*
Wreck Survey and Possible Identification of a Colonial Wreck in Cockburn Sound
Many Hughes and Dena Garratt

Introduction

In March 1987 a general survey and historical study was undertaken of a Colonial wreck, located in Cockburn Sound. The
aim of the project was to identify the vessel. The wreck was discovered in July 1977 by a local diving identity, Mr Mike Pollard, who reported finding an 80 ft Colonial wreck north of the Alcoa jetty (AiMA Bulletin 1986)
A previous study (McCarthy 1981) had tentatively identified the vessel as *Camilla*, a lighter which operated in Fremantle Harbour until 1903 when she was 'beached beyond Woodman's Point (Fremantle Harbour Trust Records 1903). Several *Camilla*'s were found in Lloyd's Register, the one most fitting the wreck in terms of size is a vessel built in Leith in Scotland in 1834. She is 281 tons with the dimension 85.9 x 23.6 x 14.5 ft. The aim of the study was to either support or refute this identity using physical information obtained from the site. The physical evidence can then be compared with archival material.

General Site Features

Location: The wreck is located on the western shore of Cockburn Sound, 200m north of the Alcoa Aluminium Refinery Jetty, 60 m from shore in approximately 3 m of water. It lies on an east west axis and can be located using visual transits
(see Log Book) and it is often visible as a dark patch from the shoe

The wreck lies on a clear sandy bottom in relatively still water. The area is partially protected, at least from south-west by the large jetty so wave action and water movement has a limited effect upon the site. Visibility is generally limited to about 3–4m due to a high contest of suspended material in the water particularly after storm periods. Although wave action is considered limited in the Sound, it should noted that the area is one of three main anchorages of Fremantle and so it is subject to a heavy traffic of large vessels. The site being in close proximity to the Alcoa Jetty and Calista Channel is exposed to water movement produced by passing vessels. It was noted that the backwash from the tankers and assisting tugs as they manoeuvre does infact wash over the site. The direct effect of this water movement has not been gauged, however it is not improper to suggest that it does have a considerable effect on the condition of the site.

Description: The bulk of the wreck is 20 m long on the East West axis and 3.5 m in breadth, standing 0.5m free of the seabed at the highest point. It appears to have its bow towards the beach and has fallen on to its starboard side. The port side has eroded and there is scattered timber and iron knees over the bulk of the site and closely surrounding area. She is classified as a wooden vessel in accordance with the description given in Paasch Marine Encyclopaedia. 'a wooden vessel is one in which all the principle portions of the hull such as keel, stem, sternpost frames, beams, inside and outside planking, consist of wood'. The condition of the wreck suggests as Paasch states that she was a well built vessel. "The most durable are those built of hardwood, properly fastened with copper or yellow metal bolts and hardwood treenails. "Therefore it is a smell wooden wreck both copper fastened and sheathed with yellow metal. She also has iron knees. Evidence of burnt timber suggests that she was burnt to the waterline so that her valuable fixtures could be saivaged. This is confirmed by the presence of four piles of burnt material in a line approximately 10m to the north of the wreck. The material seems to be burnt iron pieces and could quite possibly be the remnants of fires lit around the wreck as she lay on the beach.

Survey Method

Without carrying out a full excavation, the best method of investigating the wreck was to use a system of trilateration and a little photography to map the site. The site assessment in this case is limited to a 2 dimensional study of the bulk of the wreck and surface material only.

Details measurements and photographs of the construction methods were taken to aid in the identification. It should be noted that the measurements are as far as possible current with human error and that the interpretation of then follows an a somewhat conjectural nature.

Pre-Recording
In order to facilitate the study an amount of weeding was carried out. Mussels and weed were removed from the main body of the wreck in order to reveal the shape and identification of the objects underneath. Each object was tagged securely with white pvc tags. These were numbered from 1-70 moving in a logical sequence from the bow westward along the wreck.

Recording

Fixed Datum Points were set up on the wreck perimeter. Star-picket 'A' was set up 1 m east of the wreck approximately aligned with the centre of the wreckage. A nylon rope and tape measure were set up as the centre line, from 'A' 20 m to 'X' at the westward end. From these points (using a right angled triangle) 2 parallel lines were established 3 m on either side of the centre. These functioned an baselines. The wreck was now enclose in a surveyed rectangle made up of 9 star pickets. Any part of the site would be within a reasonable distance of at least 3 of the 9 dates points.

Method

The 3 tape trilateration method used, established the position of the major features of the wreck particularly along the periphery. The positions of the features were plotted an drawn to wale, on a site plan. Details of the wreck were filled in by drawing, using a 1 m rigid grid which was flipped end on end across the site. The result is a rough, to scale, map of the site in 2 dimensions, as it appears from above.

A series of offsets were recorded along the 'centre line' and out, at right angles using a second tape, so that at times, particular objects were positioned by 5 fixes (see Fig. 2, site plan).

After the survey work had been undertaken detailed measurements of the timbers and fastenings were made on the site and recorded. A selection of hull fittings were raised for closer study.

Conservation

The small selection of fittings, sheathing, sheathing tacks, nails and bolts (spikes) were placed in a 5% weight solution of
resin carbonate (Na2C03) to remove the potentially damaging chlorides which would accelerate the corrosion of the
fastenings. In actual fact the fastenings were in very good condition, an they had been galvanically protected by the iron
bases, which corroded in preference to the copper fastenings.

The presence of amounts of iron corrosion products Fe O.OH easily determined by their orange rust colour confirmed that
the knees were made of iron, cost probably, wrought.

Camilla
In order to establish the identity of the wreck, as many facts about the vessel as possible must be obtained from the physical remains. When a picture of the vessel is built up by its size, construction, sizes of its timbers and fittings, it will then either confirm or refute what is known about the vessel from archival sources.

Studying the material remains, the physical evidence, is the only way to ascertain the truth of the historical material. For the ease of the *Camilla* information representing her construction, class, use and ownership can be obtained from Lloyds Register and Bureau Veritas - Lloyds Universal. Since the vessel is Registered with Lloyds it is ascertained that she adequately passed her surveys. In doing so she must have also complied with regard to her construction, with the standards of building set by Lloyds. The Rules and Regulations of Lloyds can give valued information about the standard construction of vessels in various classes. It must be noted however, that the information is only standard and variations. would have recurred depending on the practice of individual shipwrights in particular yards. What can he detained from the information is the definite minimum sizes and number of timbers and fastenings, for a particular ai vessel in a particular class. From

Archival material a standard picture of a vessel can therefore he obtained.

History of *Camilla*

(As suggested by McCarthy, 1981). The *Camilla* was built in Leith, the port of Edinburgh on the Forth, Scotland in 1834. She was registered by Lloyds in this year, as a 201 ton schooner and given an 'A' classification of the First Class for 9 years (9A 1). Under the Lloyds rules, she was regarded then an being kept in the highest state of repair and efficiency.

The 9A classification was given due to her having used "Foreign Oak timber for her floors and first foot hooks or White Dantzig oak for outer planking" (Rules of Survey, Lloyds Register 1935). It may be possible to investigate this aspect of the wreck if an excavation was undertaken. The weight of the material from the port side of the vessel, could well be covering the floor sisters of the starboard side. A timber analysis of floor timbers closest to the keel could he undertaken if these are present.

Fran 1834 to 1843 the *Camilla* worked in the coastal trade from Leith to London. In 1843 she was surveyed and an 'AE' classification which removed her to the Second Description of the First Class. This meant that she had not undertaken the repairs to would keep her in the First Description of the First Class, although she was still fit to carry dry and perishable cargoes. She was not Surveyed in 1844 and appears again in 184? in Lloyds Register having undergone the necessary repairs. She has been sheathed in yellow metal and has changed hands. Yellow metal is an alloy of copper and zinc and is less expensive than straight copper sheathing. It also has the added advantages of being stronger and more durable than copper. By 1844 up to 400 merchant vessels had been sheathed in London, the *Camilla* being one of them, an Muntz metal became the major metal sheathing method utilized in Britain (Staniforth, 1985). She was restored to the first description of the First Class being again 9A. In this year *Camilla* is sent to Aden, the sheathing being obviously necessary for her trip into the warmer waters of the Indian Ocean. The English had taken Aden in 1839 which became the heavily fortified guard past to India. It is possible *Camilla* was taking supplies to the military posted there.

Is 1846 she is again surveyed an AE and in 1848 has been sheathed again with yellow metal. She makes one run to the Mediterranean in 1848 and by the next year appears to have been sold to Elder and Son and is on bar way to Port Adelaide. She must have run between England and the colony at least once for in 1853 she is again registered an leaving London for Port Adelaide. She does not appear in Lloyds Register again.

The 1850 say, the boom in wool exports from the Colonies. The *Camilla* owned by Elder and Son was, no doubt, being employed in the carrying of bulk wool to London. She was, up ?? 1853, still registered as being able to carry dry and perishable goods, in a First Class Capacity.

The *Camilla* appears in Lloyds Universal in 1885 still classed as a schooner, though she is registered as 190 tons. Between 1834 and 1886 the standard measurements for tonnage had changed, some structural alterations could also account for the loss of 11 tons during the time. The tonnage used by Lloyds is usually the 'net' tonnage the amount of under deck tonnage of a vessel.

In 1886 she is owned by a Tasmanian firm, Belbin and Company in Hobart. She is worked by the company for another four years and then in 1890 is sold to the Bank of Van Dieman's Land. She has had a change of rig by this stage, to brigantine, and is registered as a one decked vessel. De Kerchove's (1948) definition of a single decked vessel would appear to support the history of the *Camilla*. A type of vessel particularly suitable for the transport of bulk cargoes.

The Bank of Van Dieman's Late was formed in 1828 and was mainly concerned with the finance of overseas trade. The bank had a large number of shareholders who were all merchants engaged in the importing trade. The Bank appeared to ran on optimistic policies rather than secure business sense and really only survived due to boom periods in the colony's early history. McCarthur in the 1870s, who supported totally the Australasia Bank, staged a rate war against the other Colonial banks. This bid to centralize the Colonies' business to the Australasia Bank succeeded and by 1880 the Bank of Van Dieman's Land was a financial cripple although it struggled on for another decade. By 1890 the Bank was surviving on its name only and the 'buying' of the *Camilla*

can possibly he seen in the light of a 'repossession' by the bank from an indebted shareholder Belbin and Company. The Bank failed in August of 1891, which will account for the sale of the vessel on March 26th 1891 to the Orient Steam Navigation Company. This may possibly have been an attempt to liquidate their assets. The sale is recorded in the Register of British Ships in Hobart (McCarthy, 1981). The Bank of Van Dieman's Land did go through a long drawn-out liquidation, with other Colonial Banks, e.g. Melbourne Australia and Union Banks refusing to take over the business (Butlin, 1951). So, in 1891 the *Camilla* became the property of the Orient Steam Navigation Company from Adelaide. The Company is actually a British Company, who in 1877 started a regular steam service to Australia, via the Cape of Good Hope. After 1883 the Company switched be the Suez Route and started calling at Albany seeking passengers and cargoes, both outward and homeward ones. Her vessels' later carried the colonial mail (Persons, 1973). From the activities of the Company it seems that it would have employed smaller vessels to unload or carry cargoes. The *Camilla* may have operated in such a capacity for the Company. However, in 1892 she in recorded at 'being a hulk' in Lloyds Universal and is not fit for registration after 1895. Because she was owned by the Orient Navigation Company it is extremely likely that she did work is Albany, however there is no proof at all that she came to Fremantle. It is possible of course (all things being possible). If so, then she may have operated in Fremantle Harbour at the turn of the century as a lighter and was owned by a J. Ball. This vessel was condemned and beached beyond Woodmans Point in 1903. Kemps' definition of a lighter is interesting, "a dumb vessel without its own propulsion used for conveyance of cargo from ship to shore or visa versa. They are towed by tugs and are usually a bergs or similar build".

Evidence

The unknown vessel in Cockburn Sound is as aforementioned, a slight, wooden, coppered fastened vessel. As it is now, its length is a little under 20 m (60') and the height of the hull, probably to the water line, is at the most 3.5 m (12') although only the starboard side remains to any degree. The port side having been eroded. If the vessel is said to roughly between 10-12' at the water line, then it can be calculated to be between 20-25' in beam. It is sheathed in yellow metal and caulked with a fibrous matted dark substance. The iron knees, in particular their number and shape, reveal some important information. Their presence on a wooden vessel is usual. They give added strength, being formed from bent wrought iron and they connect the beam ends to a vessel's side. As de Kerchove (1948) states: "They are named from the position in which they are placed". The shape of the knees, in particular one 14 m down the wreck, suggests that the vessel could have had at least one deck, the particular knee in question appears to be a deck beam hanging knee. Also, the rather large knee found at 6-7 m from the bow and 2.5 m in length, can be identified as a hold beam knee rider, again suggesting the presence of 1 deck. The shape of this knee reveals the shape of the hull. It can be suggested that the vassal is quite broad in this case, there being no evidence of a particularly steep rise at the turn of the bilge.

Twenty-six definite knees can he identified. From Bureau Veritas Lloyds Universal 1865 Rules it is noted that a vessel of 200 tons must have at least 24 knees, being 12 pairs of hanging knees, therefore the unknown wreck can he said to be in the region of 200 to, or more.

McCarthy, 1981 identified 3 distinct wood types used in the vessel's construction, the timber analysis taken by the CSIRO, tentatively identified the keel and keelson as Ulmus, or European Elm. A treenail as Quercus - European or American Red oak and a plank as Araucaria possibly Australian or New Zealand pine.
So far, free the physical evidence of the wreck, a picture of the vessel is emerging. It is a wooden vessel, copper fastened, yellow metal sheathed, at least 68 ft long, depth at maximum 12 ft, beam 20-25 ft with 1 deck, in the region of 200 tons and built in Europe, probably repaired in Australia or New Zealand.

This evidence does correlate with the archival material gathered on the *Camilla* identified by McCarthy (Lioyds Register 1834, although there is a definite discrepancy in the length between the wreck and Camille (this will be discussed at a later stage). Paasch (1890) definition of a 1 decked vessel seems to agree with the dimensions gained free, the wreck "is a vessel of little depth, say 12 feet or less, having one complete deck; these of a depth from 13-18 ft have also (usually) one deck".

Other Measurements

Some detailed measurements were taken from the major features of the site. These can be correlated with the building regulations of Lloyds Register and Lloyds Universal which should give some support to the size and the construction of the vessel. The *Camilla* having been registered with both Registers, is assumed to have met both their standards,

Timbers
The keel and keelson are made of Elm which is allowable. The keel is moulded to 71/2" and it is sided 15". This would fit in with a vessel of 150 tons or over according to the Lloyds standard. A vessel of under 300 tons should have a keel made of 2 pieces with the scarf join overlapping by 5 ft. The keel in the case of the wreck, has broken off at approximately 45 ft, it is possible that it broke at the scarf join. one criticism of the wreck survey is that a study, in greater detail of the scarf, was. not undertaken. To verify that the wreck is definitely a vessel of 200 tons at least, 6 bolts of 3/4" diameter could have been found in the scarf join of the keep pieces.

The spacing of the bolts in the keel and keelson convey that they are bolted on every alternate floor. Each alternate keelson bolt should have gone through both and been clenched under the keel. The other one could be a dumb halt passing only through the keelson and floor.

Fastenings

The keelson bolts are 1 1/8" in diameter and 13" long and occur at every 10". For a 150 ton vessel the bolts are smaller in diameter being 1" which suggests that the wreck is larger than 150 tons. The spacing of 1 0" may show the area of the I , scarf for in this are bolts are not allowed to be inure than 13" apart. The treenails are of oak which is standard for First Class Vessels. Lloyds Universal gives the mean sire of a treenail as 7/8" for a 200 ton vessels. The treenails measured on the wreck are 1 1/4" in diameter which again confines that the wreck is likely to be close to 200 tons.

Planking

What was recognized as outer planking, Outer planking is 2 1/2" thick and has been driven through with both a treenail and a copper bolt. This pattern seems to be followed in the next piank. It would have been easier to establish the fastening of the futtocks if an depression of the timbers had been found on the planking. The distance between the fastenings is 7", which can show that the bolt and timber has been used to secure 1 floor for 200 ton vessels the siding of which is 8". The thickness of the planks being only 2 1/2' does suggest that double and single fastening would not have been a necessity. Other planks found away from the body of the wreck had width of 9" and a thickness of 2 1/2". These timbers do seen unusually large for a vessel of only 86 ft.

Bindings

The bindings of the vessel; the standard knees are 3 ft at the bone and 4 ft in length the arms. To confirm their use in a 260 tons vessel. They should have been belted through with 3 bolts in the beam and 4 in the arm. This information was, however, not confirmed on the site.

Sheathing

One square inch of the sheathing was weighed and the weight converted to the weight of sheathing per square foot. The figure resulting was 19.744 oz/sq. ft. If it follows the same weight has been lost through oxidation on the site then the original weight of the sheathing would be closer to 20 ozs per square foot. From Staniforth (1985) it is noted that in the 1840s and 1850s, outside the Navy, the gauge of sheathing varied with the size and the hull of the vessels. In Britain, the cost generally used amounts were from 25-32 ozs to the square foot with 20 ozs being for the smaller sized vessels. English sheets were designed to join midway between the horizontal joins of the planks. Usually wide, a 1" overlap at the top and bottoms. This could not be confirmed by the sheathing from the wreck as the overlap was closer to 2 Y:." and appeared to be a patched area rather than one of regular sheathing. A pintle was found at the western end of the wreck, confirming that the wreck points bow into the beach, which is the logical way to beach a vessel. It has arms of 1 ft length, the distance between them being 4" which would indicate the width of the sternpost. A 4" wide stern post does indicate quite a small vessel.

The presence of a rudder pintle does seem to suggest that the vessel was closer to the dimensions of the wreck around 70 ft, rather than the 86 ft of the *Camilla*. The discrepancy in size is one of the main obstacles in identifying the wreck. If the vessel was beached bow into the shoreline, then her stern could possibly have been in a surf zone. It does not seem likely however, that the vessel could have lost 16 ft (minimum) aft without breaking up totally.

Another explanation for the difference in the length of the vessel is that she say have been structurally altered to work as a lighter. The dimensions of the wreck do suggest quite a broad squat vessel, certainly one more like a barge, than a vessel of 86 ft.

It is not unlikely that she could have been converted, possibly to reduce the tonnage aft so that she would be more stable to carry cargo as a 'dumb' vessel. Some unusually large timbers lying North-south across the middle of the wreck seen to confirm that she may have been altered for this role. The large timbers are 1 ft wide and 9" thick and could certainly not be planks, they are fitted very closely to one another and from their position on the site it seems that they would have been placed vertically across the hold. The timbers may form a strongback placed in the hold to add extra strength and to separate bulk cargoes. This observation could confirm that the vessel was used as a lighter.

From these measurements some interesting points can be deduced. Generally the measurements taken of the fastenings and timbers do point to a vessel in the range of 200 ton. It is certainly larger then 150 ton. The width of the planking creates some doubt as to the vessel's size as 9" wide 21/2" planks do seem to suggest a much larger vessel. However, Lloyds does not appear to have a standard size for planking and to it is possible that timbers of such a size could have been used on an 86 ft ship.

Conclusion

The wreck correlates with the archival material gathered on the *Camilla* to quite a degree. However, due to some points of investigation being overlooked a definite identification not possible. Of all the known wrecks in Jervoise Bay and the surrounding area, the wreck could most likely be the *Camilla*, however, to suggest that this is its positive identity would be an exaggeration in the light of the studies completed thus far. A photomosaic would certainly have aided the investigation.

What is definite is that it is a wooden, European built, copper fastened yellow metal sheathed vessel, with a length of approx. 70 ft. It has 1 deck, is in the region of 260 tons with ease structural features suggesting that it was used as a lighter. It is situated in an area which was used as a ships' graveyard up until 191 0, and could be this *Camilla* scuttled there in 1903. The wreck, in the light of the evidence from the study, could possibly be the Camellia, Register 32403 QWBF.