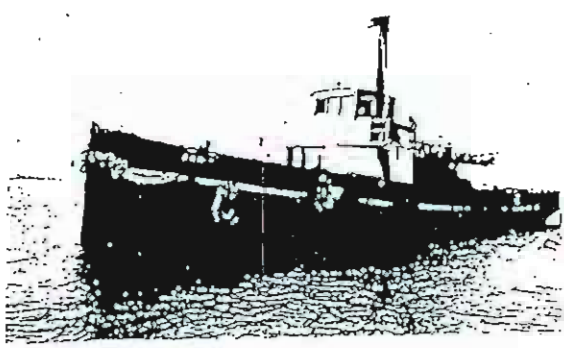
THE ALBANY REPORT

THE AWHINA SURVEY



ALBANY 1990

THE ATHENA (?) WRECK INSPECTION

ALBANY 1990

By Arthur Dahl
Madeleine Gauntlett
Sarah Kenderdine
Tim Smith

THE AWHINA SURVEY

THE ATHENA (?) WRECK INSPECTION

Abstract

These papers result from the winter 1990 expedition to Albany and King George Sound by the students of the Graduate Diploma Course in Maritime Archaeology. The survey conducted on the wreck sites of the *Awhina* and the *Athena* (?) and was undertaken by Arthur Dahl, Madeleine Gauntlett, Sarah Kenderdine and Tim Smith. The surveys were carried out over a two-week period.

It had been proposed that the survey was to be concentrated on the *Athena* (?) wreck site as it had been previously reported by staff from the Western Australian Maritime Museum, that the *Awhina* was likely to be covered with sand. Initial inspection of the sites showed the reverse to be true; that is, the *Awhina* was partially uncovered lying in a bay relatively protected from the Southern swell in two-four metres of water. The *Athena* (?) was inaccessible to diving, lying in the shallows subject to heavy wave action and swell. A preliminary snorkel inspection of this site was undertaken and the results from the survey are contained in the second of the following reports.

The first of the reports concerns the survey carried out on the *Awhina* .

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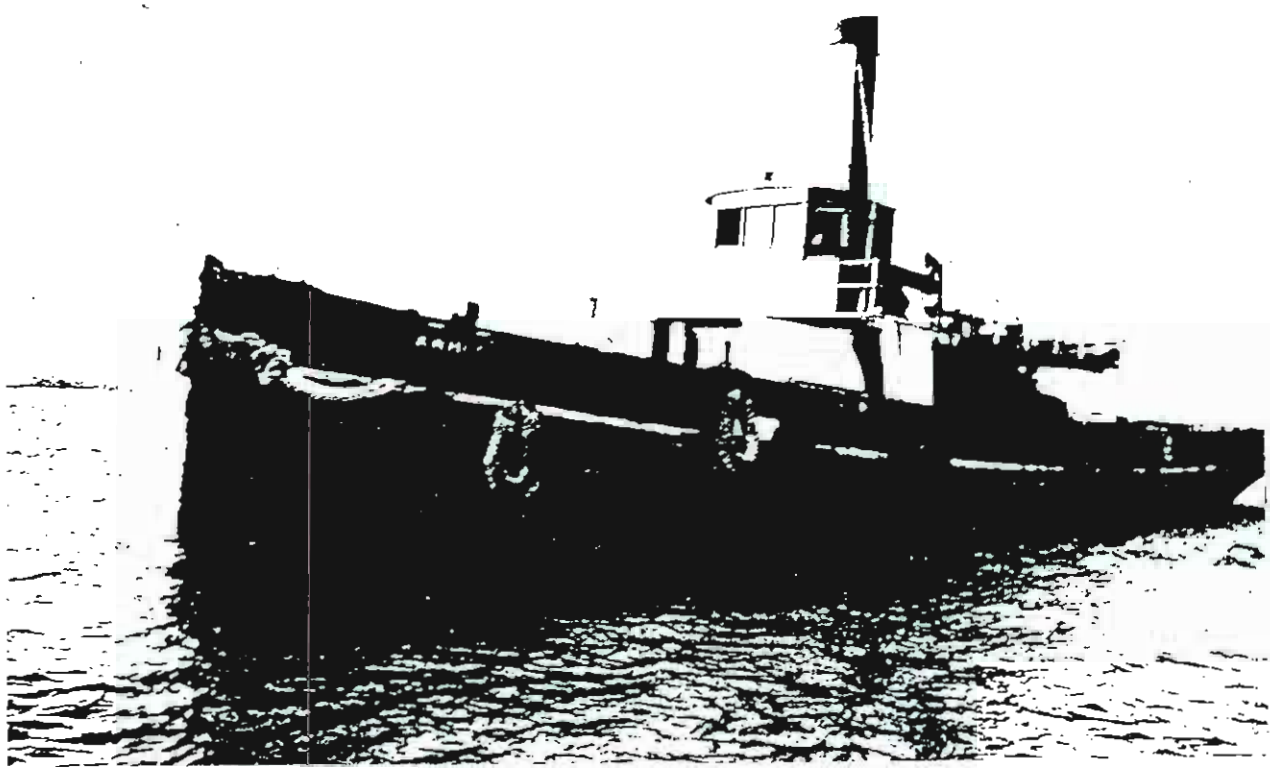

ALBANY 1990

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The *Awhina* Team would like to extend thanks to the following people:

Bob Richards, ace skipper and tolerant man.
The staff of the Albany Public Library
The staff of the Albany Residency Museum
Mr Les Douglas
Mr Stan Austin
The staff of the Conservation Department, Western Australian Maritime Museum
The staff of the Department of Maritime Archaeology, Western Australian Maritime Museum.
Pat Baker for photographic advice, processing and printing.
Gordon Marshall for oral history

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Definition of awhina

Awhina,v.t. Assist, benefit, befriend

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1.0 Introduction

The *Awhina* wreck-site was chosen as the basis of a group study project (a requirement for the Graduate Diploma in Maritime Archaeology, Curtin University, Western Australia) by students Arthur Dahl, Madeleine Gauntlett, Sarah Kenderdine and Tim Smith. Although its position was already known and the Western Australian Maritime Museum (W.A.M.M.) had a thin file on the site, it remained un-surveyed. The students' project was to fulfil two roles; that of an invaluable exercise and that of a much-needed research project.

A field-trip was made to Albany, the intention being to ascertain as much as possible about the *Awhina* , its sinking and remains. Data gathering in the field was to have two major components: (a) archival research and recording of relevant information from Albany residents, and (b) on-site recording.

A W.A.M.M. expedition team consisting of staff and students drove from Fremantle to Camp Quaranup, Vancouver Peninsula, Albany on 2, July, 1990, returning on 14, July. Food and accommodation was provided at the picturesque former quarantine camp for the duration of the field-trip. A variety of research projects was carried out by other groups at the same time as the *Awhina* survey. Temporary equipment stores, workshop, conservation facilities and work-rooms were set up. A jetty was available within a few minutes walk from the base camp at which the museum's work boat the *Seaspray* was moored.

The Albany Residency Museum's files were consulted yielding information about the *Awhina* 's history, a number of useful photographs and references. More archival sources were found at the Public Library and copies of relevant newspaper articles were obtained from the main office of the Albany Advertiser. Local information was given by many people, notably amateur historian, Stan Austin.

After an initial overland reconnaissance trip, daily excursions (weather-permitting) were made to the site in the museum boat. The boat served as the base for diving operations using the hookah system.

Evenings were spent consolidating data gathered during the day.

The following report outlines the history of the *Awhina* , the survey techniques used on-site and discussion of the findings. An integral part of such a survey must be the recording and analysis of data to assess the need for conservation, both on-site and of any artifacts raised. Before concluding, a proposal for future site management is outlined.

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2.0 Archival Reconstruction

The *Awhina* was built in Auckland, New Zealand in 1884 by Hector Macquarri. The vessel was a 100ft screw tug of 136 tons, with a 21ft beam and a draft of 10ft 5in. Further dimensions are given in Table 1 of the Appendix (Auckland Port Records 1884).

The *Awhina* joined the Armstrong and Waters fleet in Albany harbour just before 1914 (see Figure 1). It was already 30 years old. During the war years 1914-1918, King George Sound was the rendevous for the first troop convoy from overseas, and many other convoys thereafter. Every available tug and launch worked extensively to service these ships and cater for the crew and soldiers, the *Awhina* notable among them (*Albany Advertiser* Sept. 1977).

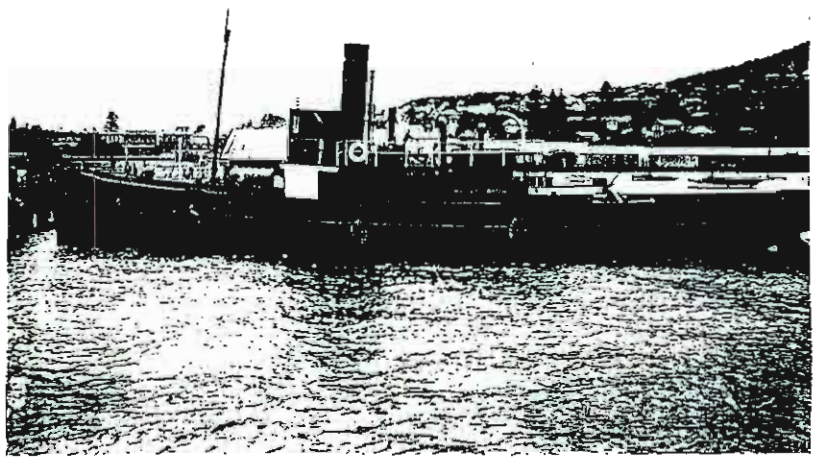

Figure 1 The *Awhina* at an Albany jetty.

The *Awhina* had been described as a "busy little ship day and night". When the ss *Castlemoor* sent out distress signals off Albany and came into King George Sound with her coal bunkers on fire the *Awhina* , fitted with powerful salvage pumps, prevented the ship from becoming a total loss (*Albany Advertiser* Sept. 1977).

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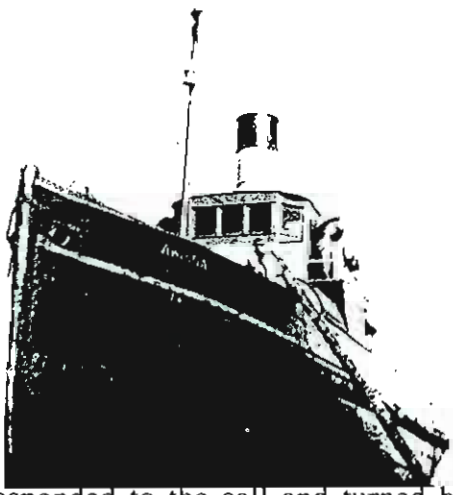
In 1936 the *Awhina* sunk at its moorings at the town jetty landing stage (see Figure 3). A diver (see Figure 4) was sent down to plug a leak in her stern, and then the whole ship was set back onto an even keel , pumped out by the tug *Bonthorpe*. From here the vessel was moved to another berth and parts were salvaged.

> A handful of spectators watched as the lines of the *Awhina* were cast off for a last time and the escorting Bonthorpe nosed her from the jetty. Slowly the battered old hull responded to the call and turned her nose east for the last time (*Albany Advertiser* August 1980).

The "graveyard" on Gull Rock Beach at the northern end of King George Sound was reached and *Bonthorpe* brought her charge to within 0.4 km of the shore, a small launch then took the securing lines and beached the *Awhina*. Explosives were placed in the timbers and tar and oil poured on the decks and set alight. The New Zealand pine (kauri) was said to burn well but the tug was not completely destroyed by this method.

Although it was hoped that the strong westerlies would completely destroy the remains, ribs,other timbers and the boiler were all visible in 1980.



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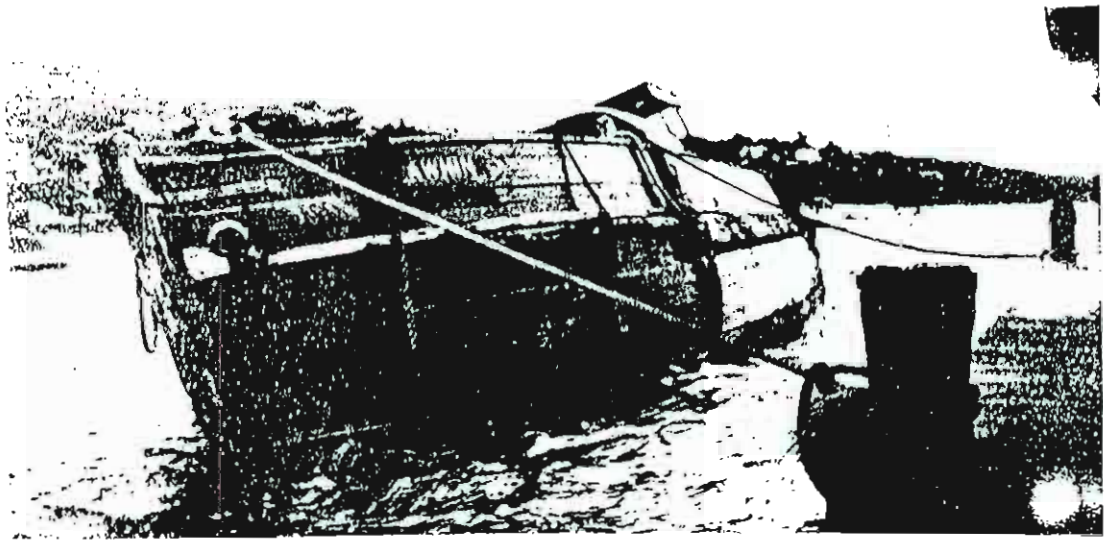

Figure 3 The *Awhina* listing at its moorings

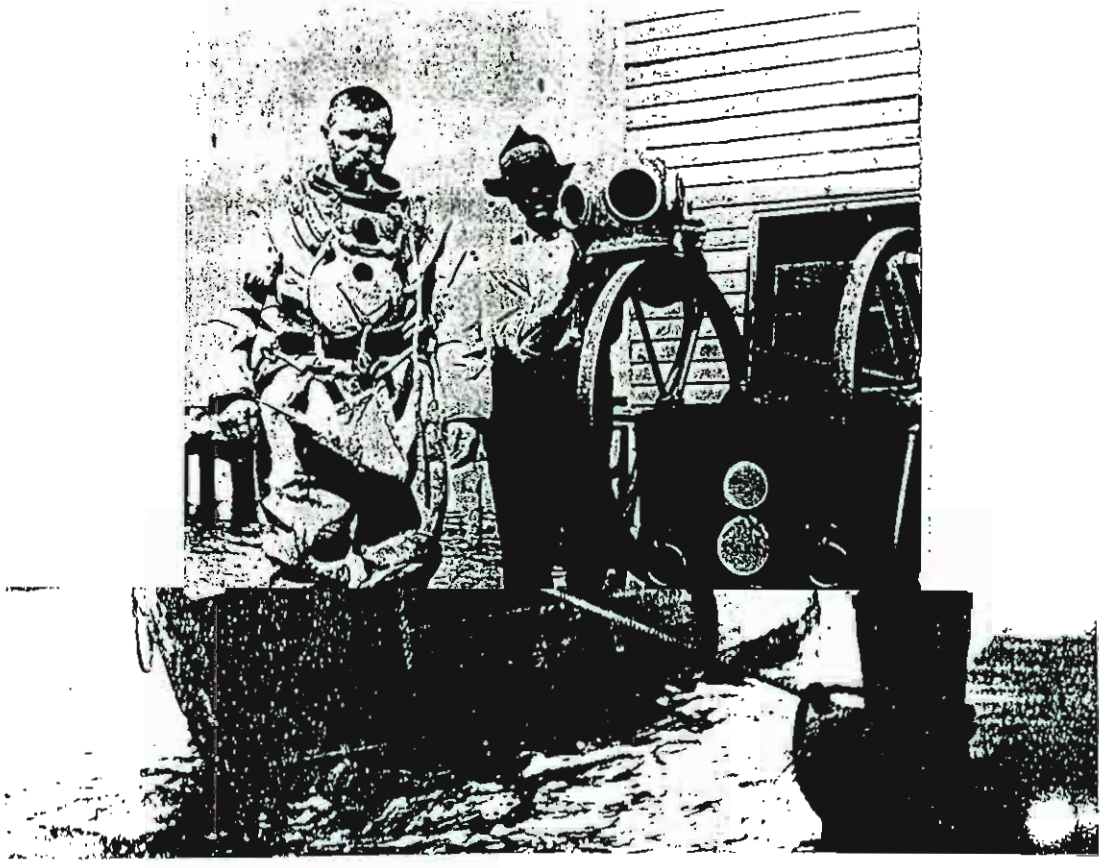

Figure 3 The *Awhina* listing at its moorings

3.0 Oral History

Contact has been made with Mr. Les Douglas, a former crew-member on the Awhina. He has already supplied some very interesting anecdotal and photographic reports of the history of the Awhina. In time it is hoped that he may be able to find further material of relevance.

4.0 Tonnage

The tonnage of a vessel, being the capacity which the body or hull has for carrying cargo or weights, can be one of five different measurements (Desmond 1984: 25). Those referred to in Table 1 of the Appendix are both gross registered tonnage (total internal capacity of vessel as measured by a government surveyor for the purpose of registration) and net registered tonnage (ascertained by deducting the measurement of space occupied by engines, steering apparatus, and certain designated spaces that cannot be used for the storage of cargo)(Desmond, 1984: 25). Levies are made based upon the magnitude of net registered tonnage minus deductions.

The method of measurement of the gross tonnage and of the deductions allowed to compute net tonnage varies from country to country. It has also varied over time: since the first British Merchant Shipping Act during Elizabeth I's reign, the methods and formulae for calculation of tonnage have changed repeatedly. Throughout this period of change, one would expect the shipping trade to have accommodated the design of new vessels to take best advantage of the prevailing rules. Indeed, it is thought by some that the Clipper Ships were designed primarily to minimise registered tonnage whilst maximizing available cargo capacity, speed being a secondary consideration (MacGregor, 1973).

The tonnage of the *Awhina* was calculated using the

> formula of Rule 1. to be used in taking the Measurements at the Ship, & calculating the Tonnage under the Merch. Ship. Act, 1854 (see Table 1 of the Appendix)

The Merchant Shipping Act (Merch. Ship. Act) of 1854 consolidated or superseded 48 Acts before it. Consisting of 548 sections plus various schedules, it was amended with the passing of another Act within only 4 months of coming into force. Between 1855 and 1892 inclusive, 23 statutes

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The measurements for the *Awhina*'s tonnage were taken on 12 September, 1884 and on 14 May, 1885 at the port of Auckland, New Zealand.by a measurement surveyor (see Table 1 of the Appendix). By close inspection of the tables it can be seen that the "Rule 1" referred to under the Merch. Ship. Act, 1854, as applied to a vessel of the *Awhina*'s specifications, is the same as that still holding in the new 1894 Act (Hamilton, 1896: 488, 499, 763-766).

After the calculation of transverse areas and, subsequently, tonnage under the deck, the cubic content of the closed-in space above the engine room was added to give gross registered tonnage.as per the Second Schedule, Measurement of Tonnage, Rule I, Merch. Ship. Act, 1894 (Hamilton, 1896: 763-4). Deductions were then made to give nett tonnage. Looking at the second page of the tables it is noted that the enclosed space over engine room (less that part taken up by the bunker) added to the boiler space is 66.43 tons. This represents the

> space occupied by the propelling power (Hamilton, 1896: 489)
> an allowance for which is made under the 1894 Act
> in the case of any ship propelled by steam or other power requiring
> engine room (Hamilton,1896: 489)

This space represents 49% of the gross tonnage (135.98 tons). The addition of 75% of the 'space occupied by the propelling power' to the allowance is as prescribed in Section 78 (1) (b) of the Appendix No.1 of the Merch. Ship. Act, 1894 (Hamilton, 1896: 489) for the case when the percentage previously mentioned exceeds 20% for a screw propelled vessel.

It is interesting to observe that the rules for measuring tonnage in 1885 under the amended Merch. Ship. Act of 1854, as regards a vessel of the *Awhina*'s specifications, are identical to those laid down in the Act of 1894. It would seem reasonable to conclude that the rules for such a vessel remained unchanged between 1854 and 1896 (the year of publication of Hamilton's book) since the Act of 1894 was simply a consolidation of all amendments since 1854.

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5.0 Initial Inspection

The initial snorkel swim on the *Awhina* proved the vessel to be a wooden ship with copper sheathing, rather than the iron ship recorded as the *Awhina* in West Australian Maritime Museum records. The extent of the exposed remains included the length of the port side with varying degrees of exposure. The boiler positioned centrally and extended above the water line. Major features identified included a gudgeon, propeller block and planking.

The *Awhina* site was located 60 km by road from the Quaranup base camp. Therefore access by boat to the work site was considered preferable and time effective, being only 5 nm from the base camp. The nature of the site(shallow and relatively open) made the use of hookah supplied air a feasible dive scenario. The *Seaspray* was considered a suitable dive platform.

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6.0 Site Description

Location Ledge Bay, just off Gull Rock Beach, King George Sound.

Monocular Compass Bearings

Possession Point	257 °
Cheyne Head	270°
Gull Rock North End	235°
Gull Rock South End	222°

Sextant Angles

Cheyne Head - Gull Rock North End	41°9'30"
Cheyne Head - Gull Rock South End	52°2'35"
Ledge Point - Cheyne Head	69°22'35"
Ledge Point - Gull Rock North End	27°57'7"

Global Positioning System with 4 satellites up; 11,13,14,19.

2.08pm, 4 July 1990.

Latitude:	35° 00°.843(4)
Longitude:	118 °00°.167(89)

Stern to bow bearing: 140°

Photo transits locating the site were prepared and added to museum files.

Access see Map 1.

Gull Rock North End	235°
Gull Rock South End	222°

Sextant Angles

Cheyne Head - Gull Rock North End	41°9'30"
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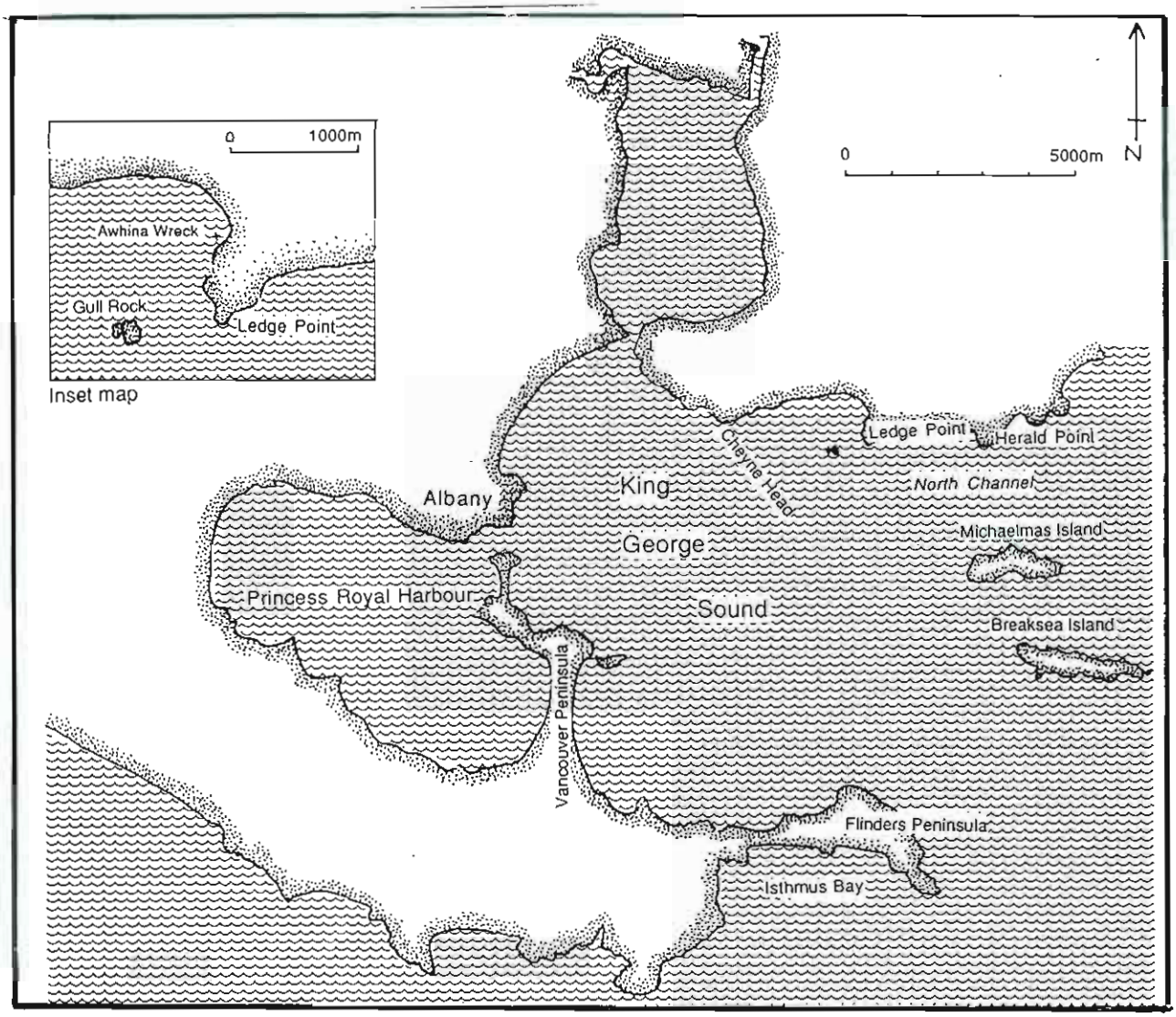
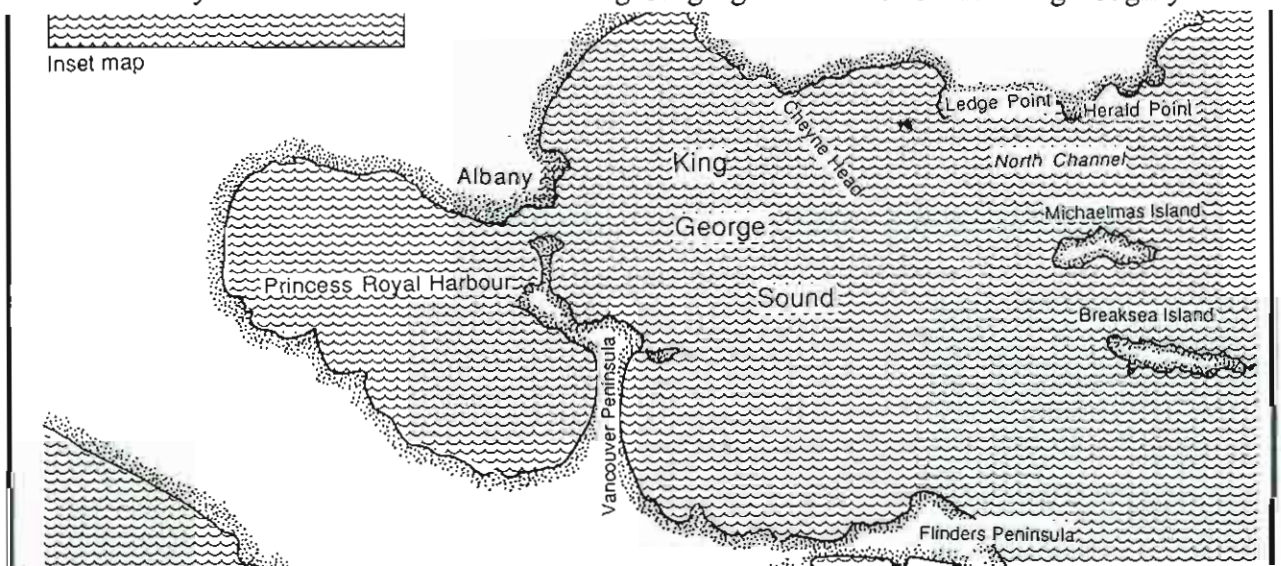


MAP 1

Conditions

During the course of the survey, surface conditions ranged from smooth to one metre swell and winds were predominantly from the North at 10 - 20 knots . Below the surface, conditions varied from zero to five metres visibility. Because the wreck is situated at a depth of two to four metres, the entire survey was carried out with strong surging water motion running roughly



7.0 Survey Techniques

An overall plan of the site was considered the main priority, having at best ten days to complete the entire survey. Alternative methods were to be employed and tested; trilateration, least squares adjustment, photography, offsets and using one metre square grid frames . Further objectives were developed as the plan survey proceeded, in accordance with the amount of useful information that could be obtained from them, and the time available. Trilateration proved to be extremely difficult in the surging conditions. It was often impossible to see beyond the first few metres of the tape and the catenary effect and continual snagging rendered this technique impracticable. Those measurements recorded have, however, been incorporated in the final analysis. The least squares technique was rejected for the same reasons.

Whilst a photographic study of the area was completed in the hope of putting together both plan and profile photomosaics, results were far from satisfactory due to poor visibility and the unpredictable conditions. In spite of this the plan photographs have proved an invaluable record and were constantly referred to during the final laying-up of the site-plan. A port profile mosaic was also laid up (see Appendix).

The general layout of the wreck and the boiler dictated that a useful technique for the situation was to lay down a steel wire baseline and take offset measurements to the continuous port side hull (see Figure 5). These measurements were useful for drawing the site-plan. Offset measurements were taken at 1m intervals along this line to the hull remains.

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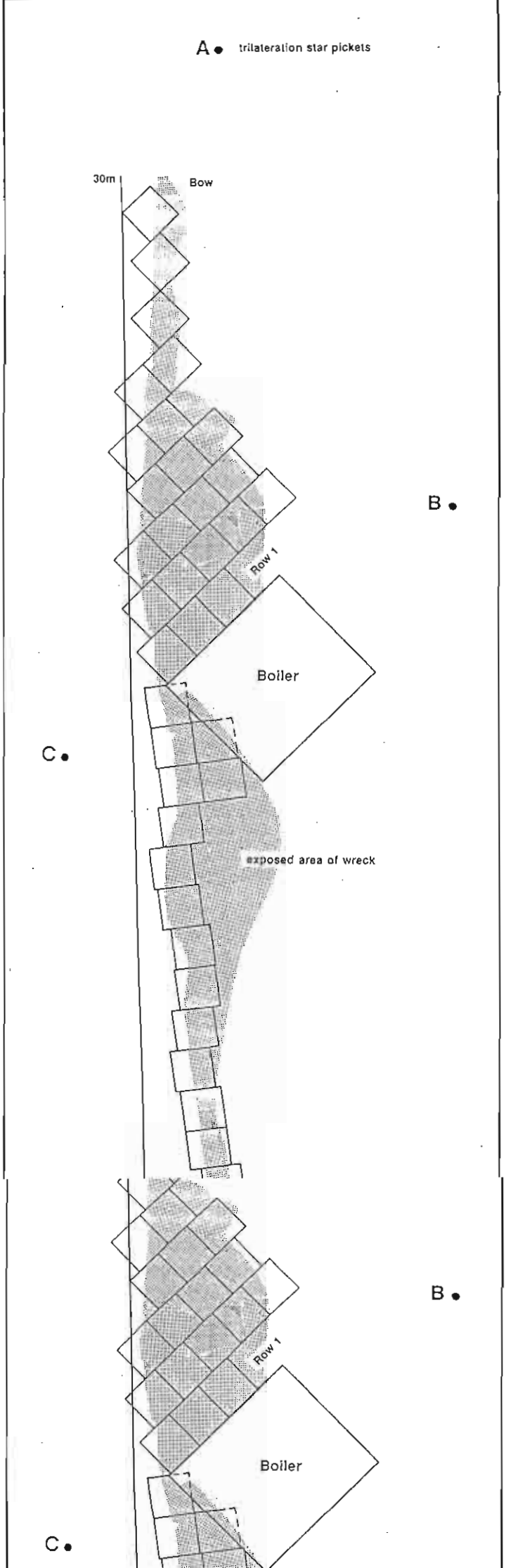
A • trilateration star pickets
30m
Bow
B •
Row 1
Boiler
C •
exposed area of wreck
B •
Row 1
Boiler
C •

An alternative method was then tried in order to attempt a site-plan. The most sheltered part of the site was located immediately forward of the boiler. A strip of three 1 x 1m grid frames was laid down using the boiler face as a reference plane (see Figure 5). Weighting the grid-squares down with lead made this a viable technique in the surging conditions. It was possible to obtain a significant amount of detail in a relatively short period of time, and the technique was particularly suited to this area of the site where the hull timbers were clearly exposed. The success of this test led to the extension of the grid-frame layout further forward of the boiler. A series of 1m grid lanes were pegged out across the site (using luminous line) to ensure accurate alignment of the squares. Twenty-three 1 x 1m grids were then drawn up over the exposed area of the wreck from the boiler to the bow over a three-day period. A similar process was adopted in the area aft of the boiler, less severe surging then prevailing. This region contained fewer exposed remains. A strip of 1 x 1m grid-frames was extended along the surviving port edge of the vessel to the stern and details drawn in.

The individual grid drawings were redrawn at a scale of 1:10 and then combined to produce the complete site plan (see Figure 6). The offsets taken off vessel from the baseline proved most valuable for this. The entire drawing was reduced to a manageable scale and the final inking completed.

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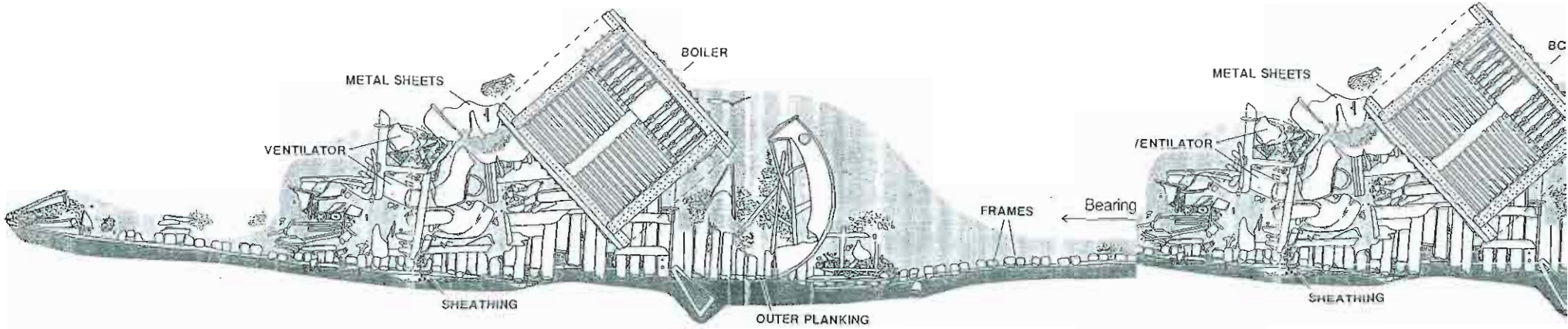

AWHINA (1884): SITE PLAN

84): SITE PLAN

Figure 6

13

8.0 Survey Findings

8.1 Boiler (see Figures 7(a), (b), (c), (d))

The *Awhina*'s boiler extends approximately 1 m above the water's surface at high tide (see Figures 7(a), (b)). It is orientated at about 45° to the centre-line of the vessel (see Figure 6), and is inclined at 11° to the horizontal (see Figures 6, 7(a)). It rocks slightly with the incoming swell and waves that break over it. Interestingly the boiler used to rock from side to side while the ship was in operation (Mr Les Douglas, Personal communication).

According to a former *Awhina* crew-member (Mr Les Douglas) this boiler had been relocated from another larger vessel. Douglas believes the one we examined was very large to be on such a vessel and, as noted in the oral history section above, it left little deck space.

The survey of the *Awhina* hull revealed some interesting features in the area of the boiler (see Figure 8). Generally the transverse members of the ship (i.e. the frames) were grouped in pairs 15-20 cm apart. However, they were more tightly spaced where they ran under the boiler, probably for structural strength. A number of heavier longitudinal timbers appear to have to have run under the boiler also, perhaps for a similar purpose (see Construction Details section generally)

The boiler (a Scotch type), a single ended marine return tube boiler was considered an efficient steam generator (see Figures 7(c), (d)). It consists of a cylindrical shell with two furnace tubes and two combustion chambers communicating with several rows of small tubes (flues) placed above each furnace tube. The combustion chamber of this type gives uniformity of steam supply and if the furnaces are fired alternately it favours the combustion of fuel gases and the prevention of smoke, of obvious benefit on a boat (Hutton,1903: 289).

Separate combustion chambers increase the heating surface of the boiler, but the space available for combustion is frequently so restricted as to impede

Figures 6, 7(a)). It rocks slightly with the incoming swell and waves that break over it. Interestingly the boiler used to rock from side to side while the ship was in operation (Mr Les Douglas, Personal communication).

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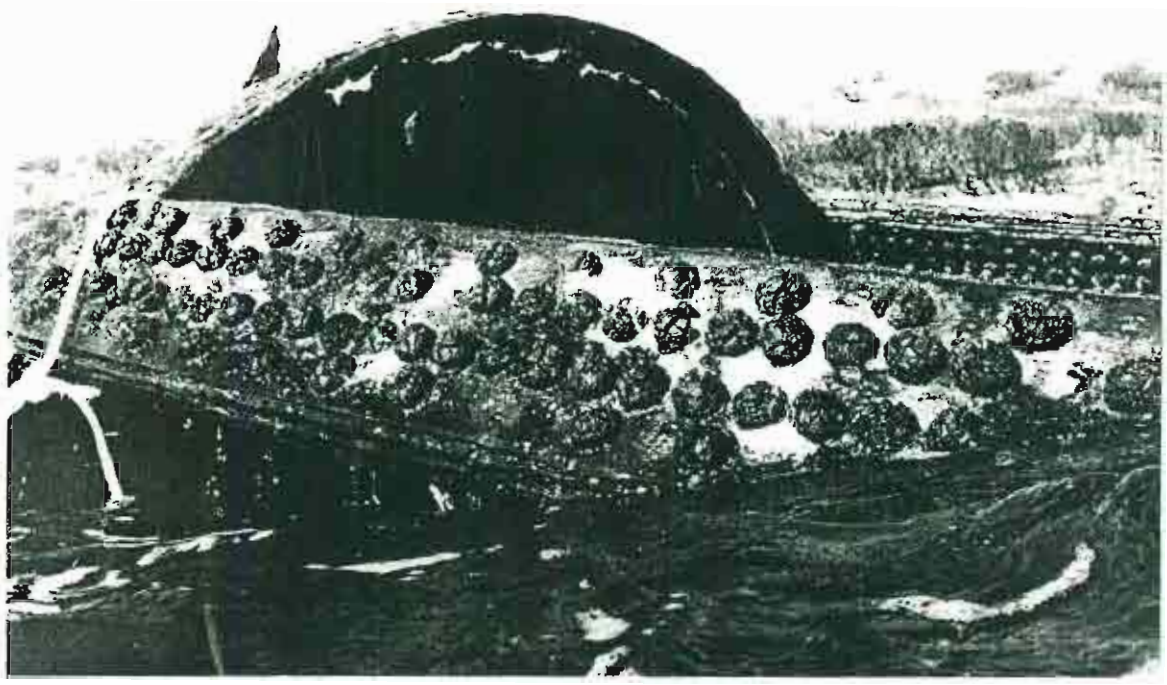
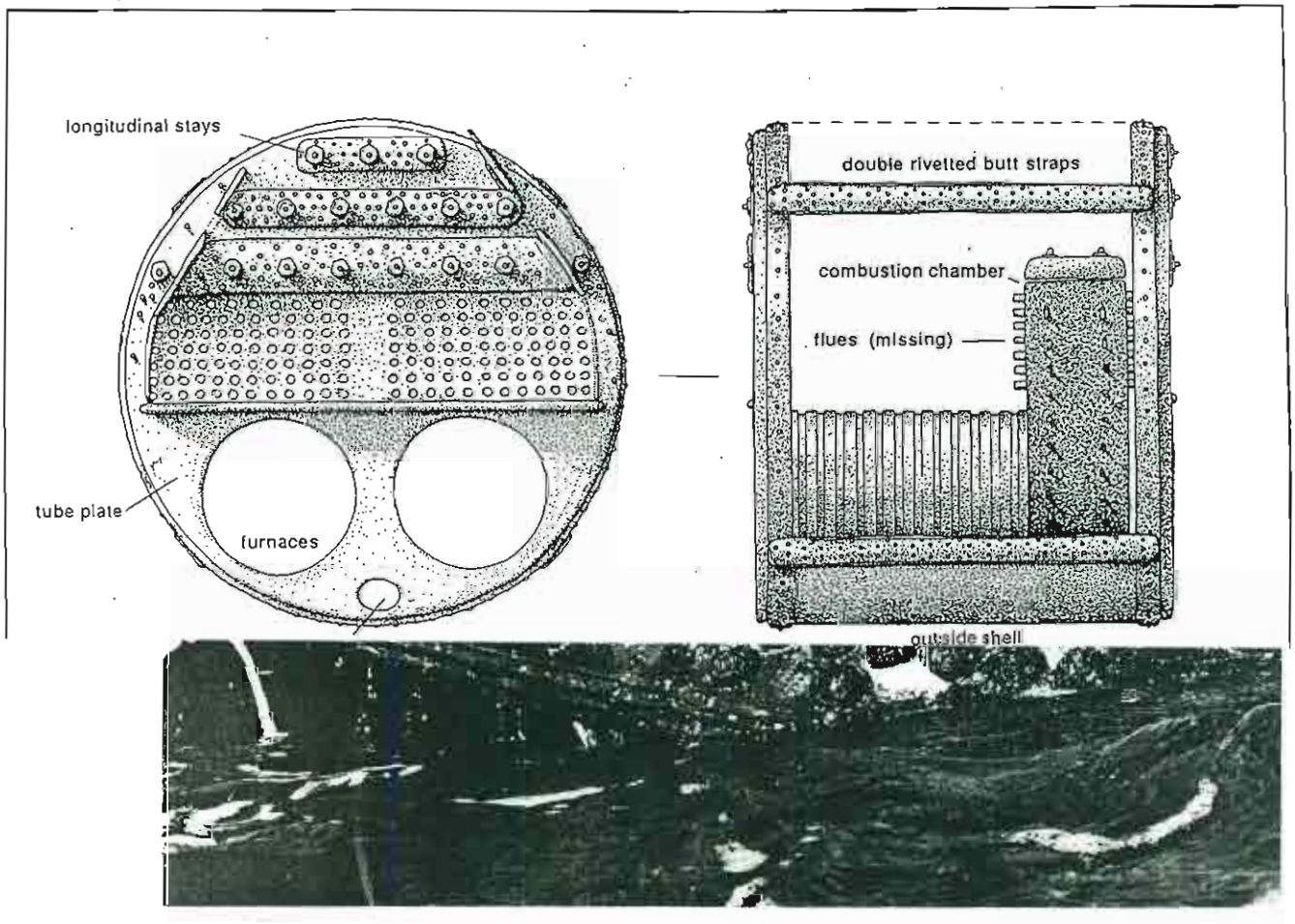


Figure 7 (a) Boiler illustrating double rivetted butt straps



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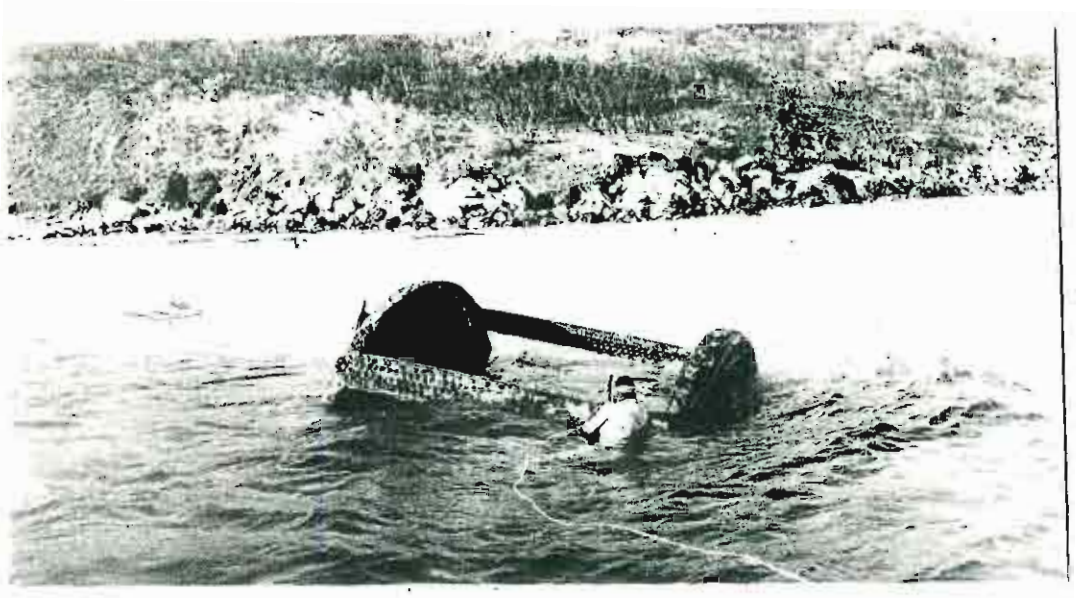


Figure 7 (c) Boiler clearly visible above water surface

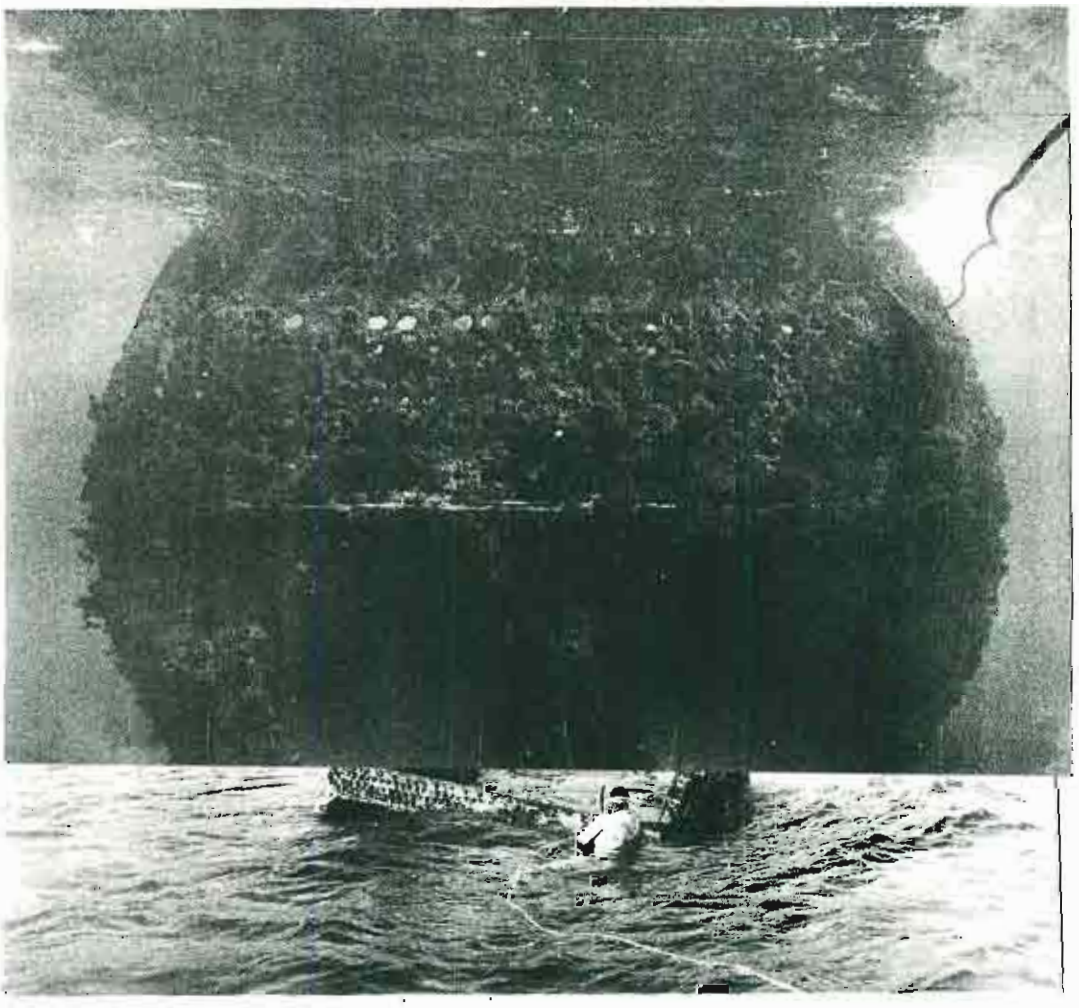
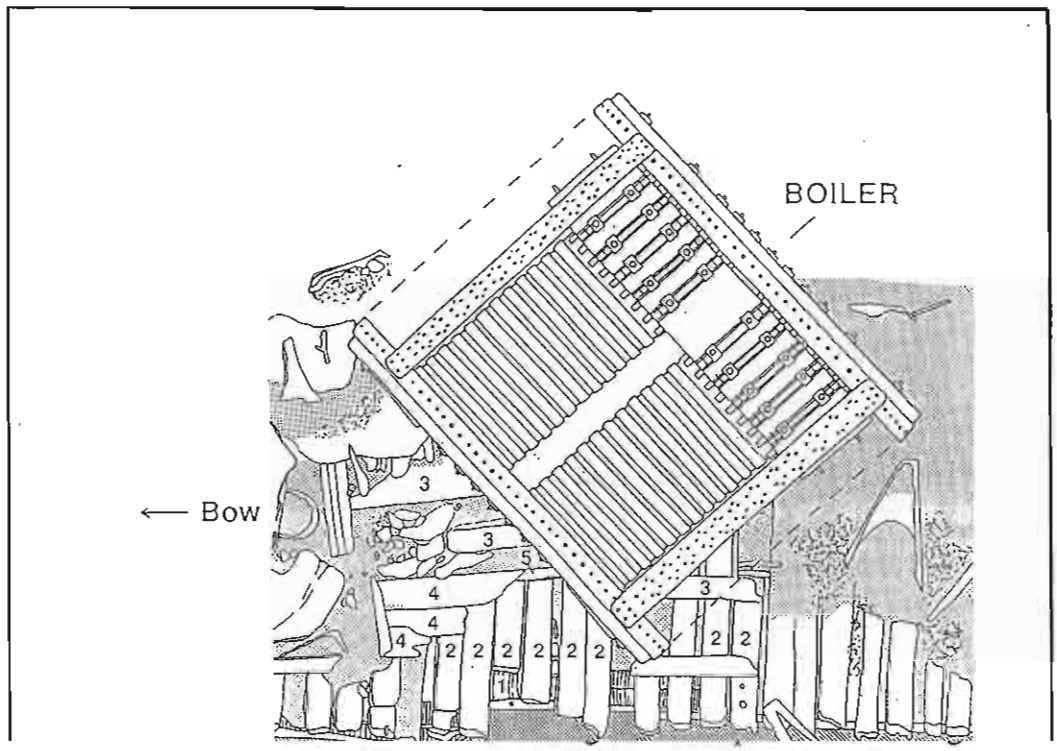


Figure 7 (c) Boiler clearly visible above water surface

The dimensions given for the boiler space are: 17 x 12.4 x 11 ft.(see Table 1 of Appendix). As already noted, the boiler we examined had a diameter of 10 ft. This would leave 3.5 ft. on either side of the deck; enough space for crew to get past but hardly optimal working conditions.

According to a table on the power of marine return tube boilers (Hutton, 1903: 299) the diameter of a boiler of 10 ft should have a corresponding length of 9 ft 6 in or 10 ft. Neither of these latter lengths correspond to the length of the *Awhina* boiler examined (8 ft). Disregarding this irregularity the indicated range of horse power can be assumed to be between 333 and 400 I.H.P.(Hutton 1903: 299).

It is not possible to calculate a horse power from the boiler space dimensions given in the ships measurements (see Table 1 of the Appendix A) because this area probably included some bunker space.



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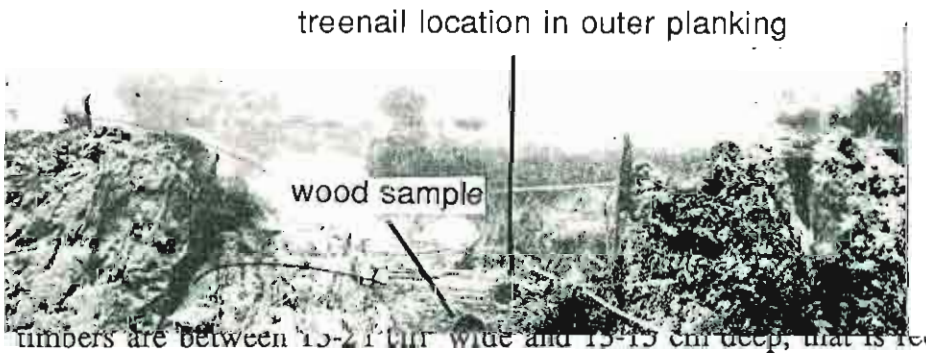
8.2 Timbers and Hull Construction

Although much of the Awhina site was buried in shifting sand, tentative comments can be made regarding the construction techniques used for the vessel as evidenced from the exposed timbers.

The most striking feature of the remains are the pairs of heavy curved transverse timbers which are found along the length of the vessel. These timbers are between 15-21 cm wide and 13-15 cm deep, that is rectangular in section. The individual pairs are spaced 15-21 cm apart. The majority of these timbers were only partially exposed, and have suffered extensively from toredo worms. Those timbers situated around the boiler were more tightly packed, in some instances flush with each other (see Figure 8, timbers numbered 2). These timbers were also heavier in proportion, up to 25 cm in width. This arrangement suggests concerns with the region of the vessel under the boiler and it having been given additional support.

The remains of longitudinal timbers were noted along the length of the exposed port side of the hull (see Figure 8, timber number 1). These timbers were 7- 10 cm. thick and were fastened to the external face of the frames, with metal sheathing tacked on to them. They therefore constitute the outer planking of the hull. Within the wreck, the accumulation of sand meant that only the planking section was visible. When the hull was viewed from the exterior, between 20 to 40 cm. deep of planking could be seen rising from the sea bed. It was not possible to ascertain the width of the outer planking of the hull as the sheathing obscured this detail. Also, the method of fastening the strakes of the planking to the frames is largely hidden. Occasional treenails in the timbers (see Figure 9) suggest a typical method of fastening .



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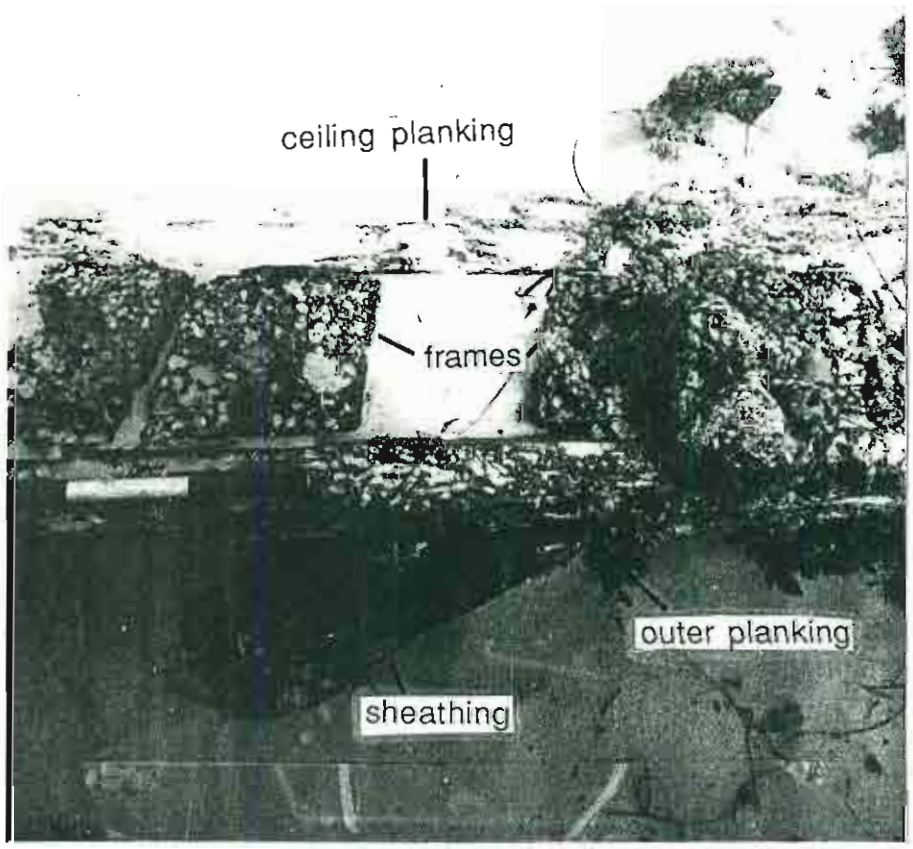
In some places along the the length of the vessel, remains of longitudinal timbers are attached to the interior face of the frames. These are probably ceiling timbers and are smaller in dimension than the outer planking (see Figure 10). Remains of a number of thin sectional boards found immediately forward of the boiler include 3 planks laid edge to edge (see Figure 8, timbers numbered 4). Another example (timber number 5) lies beneath the previous three with the same orientation. Their insubstantial nature suggests their function may have been as lining boards on the interior of the hull.



A number of heavy timbers were located running underneath the boiler (see Figure 8, timbers numbered 3). Because the boiler obscures the true orientation and function of these timbers, any conclusion must be considered tentative. A major member, 43 cm. wide and 10-15 cm. deep, runs under the centre of the boiler and is aligned along the centre line of the vessel. It is possible that the boiler rested on this massive support. Another large timber, 21 x 15 cm, runs parallel to this and again disappears under the boiler.

All of these examples probably support the boiler which appears to sit directly on the hull timbers. Although a probe survey was undertaken this did not yield further details. Therefore the critical hull sections and keel construction details could not be revealed without excavation. Substantial remains of the underside of the hull are likely to be preserved beneath the boiler.

The construction of the bow remains uncertain due to its covering of marine growth. The bow stands to a maximum height of .40m above the sea bed. The exterior is entirely sheathed with copper. A solid, vertical stempost is partially visible, but its details are more clearly seen from contemporary photographs of the *Awhina* (see Figures 2 and 3). Four metal fastenings protrude horizontally from the stempost, one above the other, and probably fixed the deadwood to the stempost (Figure 11 (a)). Two heavy wooden beams (16 cm square in cross-section) run into the bow and form part of its framework. The bow generally appears to be solidly constructed, a feature necessary for tugboats.

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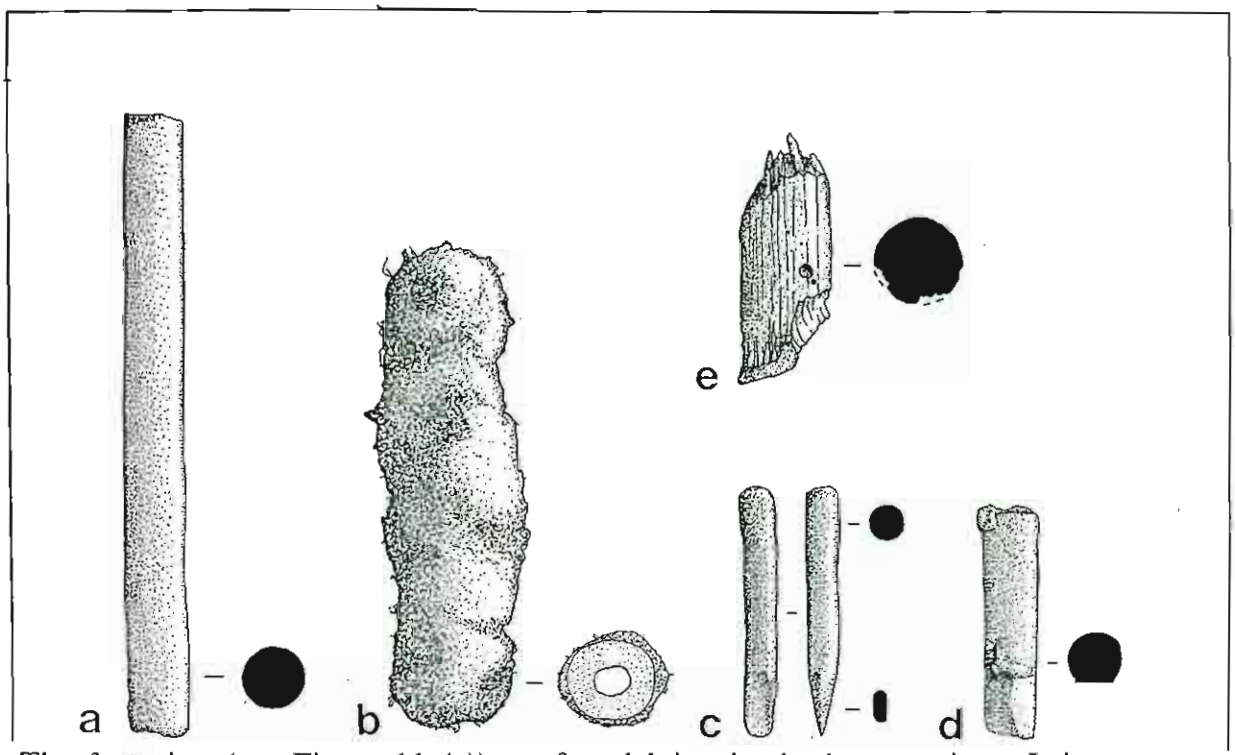
8.3 Fastenings

Four fastenings and a section of rail were raised from the *Awhina* site for analysis and future conservation treatment. Their specific metallic composition has not yet been fully analysed although general categories can be isolated. The following list of fastenings does not aim to represent the total range used in the *Awhina* (McCarthy, 1983: 1).

The fastening (see Figure 11 (a))was found lying in the bow section. It is identical to four others, which are still in situ (see Figure 6). They pass through the remains of the stem post and appear to be 'through fastenings', that is they pass through two pieces of timber. The retrieved object has its ends missing, but it most probably represents a 'clinch bolt'. These have their ends riveted over a washer or clinch ring. They are typically used to fasten stems and deadwood (McCarthy, 1983: 18). Initial inspection of the metallic composition and weight suggests a copper alloy. Length 23.5 cm, diameter 2.3 cm.



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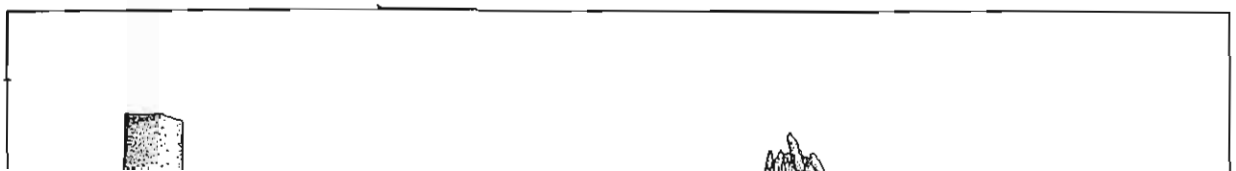

Part of a rail (see Figure 11 (b)) found lying in situ 1.5 m forward of the boiler. The broken section reveals a heavily concreted outer layer, while the metal corrosion within records the original rail diameter of 3 cm. The nature and the colour of the corrosion suggests an iron composition. Length 18 cm, diameter with concretion 4 cm.

A spike (see Figure 11 (c)) was found lying proud of the exposed timbers immediately forward of the boiler. Although the head is missing, the cross-section shape and overall length suggests a 'dump bolt'. These are fairly typical metal bolts with pointed ends which are driven through one timber and just into the next. A typical example is the attachment of a plank to a timber for added security. Preliminary analysis of the metallic composition suggests a copper alloy (possibly brass). Length 9.2 cm, diameter 1.3 cm.

A fragment of a metallic fastening (see Figure 11(d)) whose original position is unknown was found. This example remains difficult to type although its diameter suggests that it may also be a piece of a 'clinch bolt'. The flattened side may have resulted from its manufacture, or from being driven through a semi-squared opening. Metallic composition suggests a copper alloy. Length 8.5 cm, diameter 2 cm.

Figure 11 (e) is most probably a treenail, a long cylindrical pin of hardwood used for fastening the inside and outside planks of a ship to the main structural members (McCarthy, 1983: 13). Length 8, 5, 9 cm, diameter 3.5 cm (also see Figure 9).

No sheathing nails were recovered. However good examples of the sheathing nails survive in situ in the copper alloy sheathing along the port side of the hull. They correspond to the standard type known to wooden ship building, having a flat round head head and a square shank. They were 5 cm long. Initial inspection suggests a copper alloy composition (McCarthy, 1983: 9).

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8.4 Miscellaneous Features

Water Tank (see Figure 12)

The water tank was located 50m away from the stern section of the vessel. It was partially covered in sand and so no useful measurements could be taken to help in its analysis.

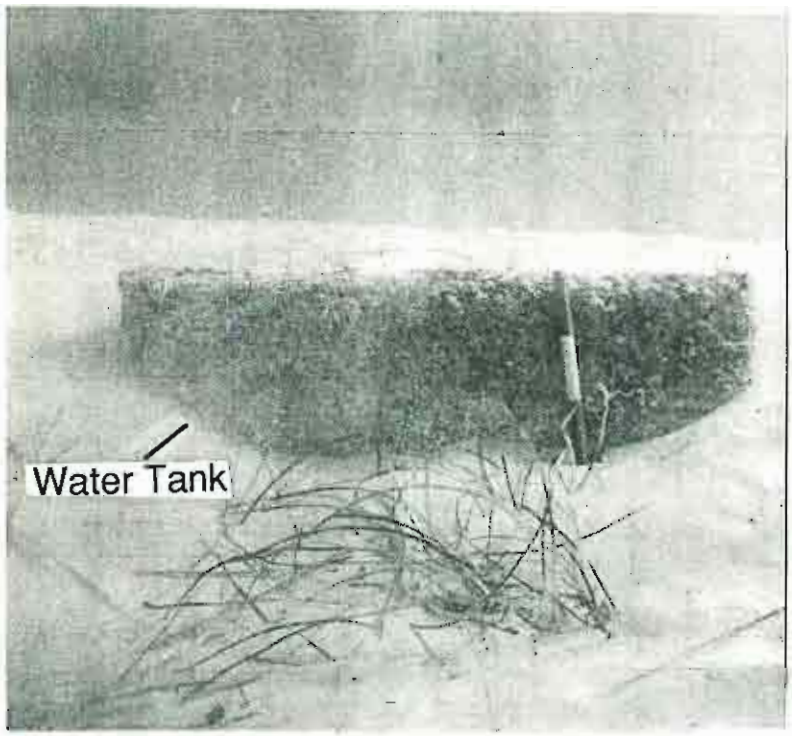
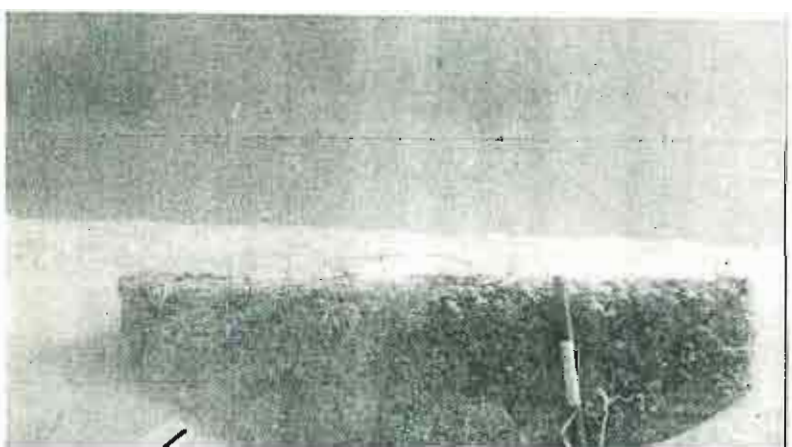


Figure 12 Water Tank



Deadeye ? (see Figure 13)

The feature in question was located 6.5 m aft of the bow and is of metal construction. Although it was originally thought to be a dead eye this assumption has be questioned with future analysis. While the photographic evidence indicates that the mast was located in this region it does not show any deadeye associated with it. Further, deadeyes were generally constructed of wood not metals and are not of these large dimensions.

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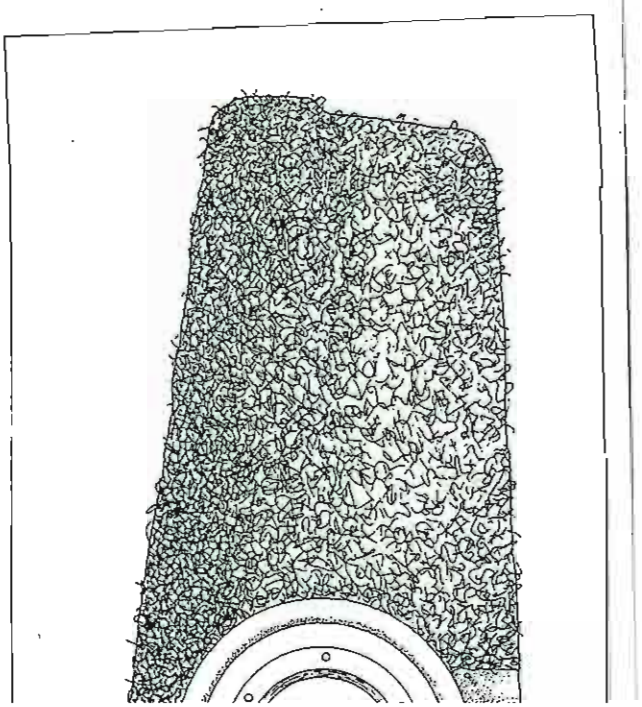
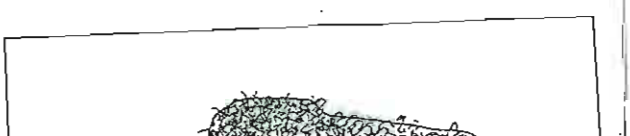
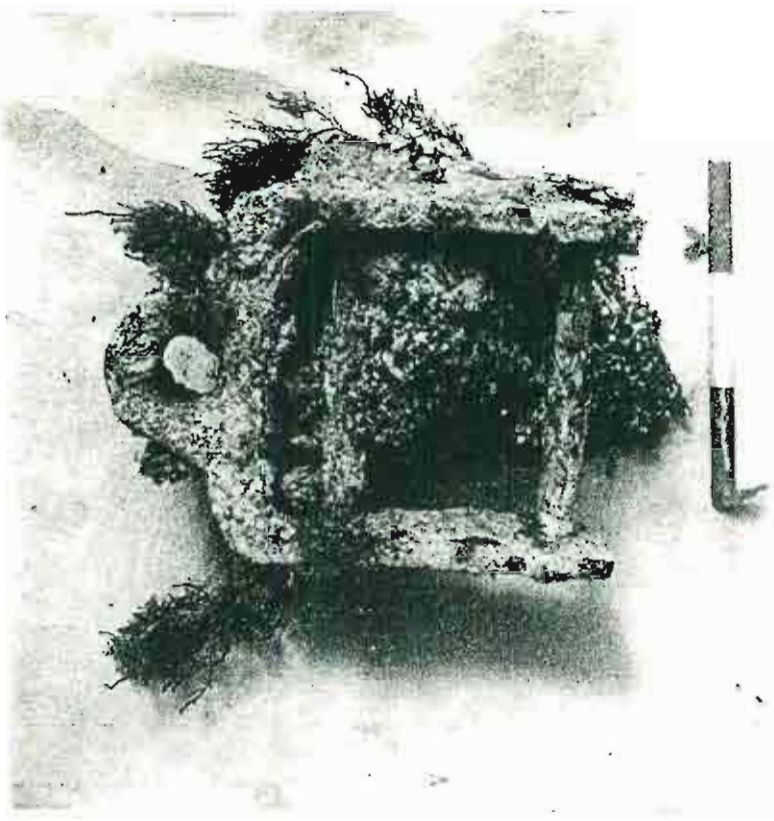
Propeller Block (see Figures 14 and 15)

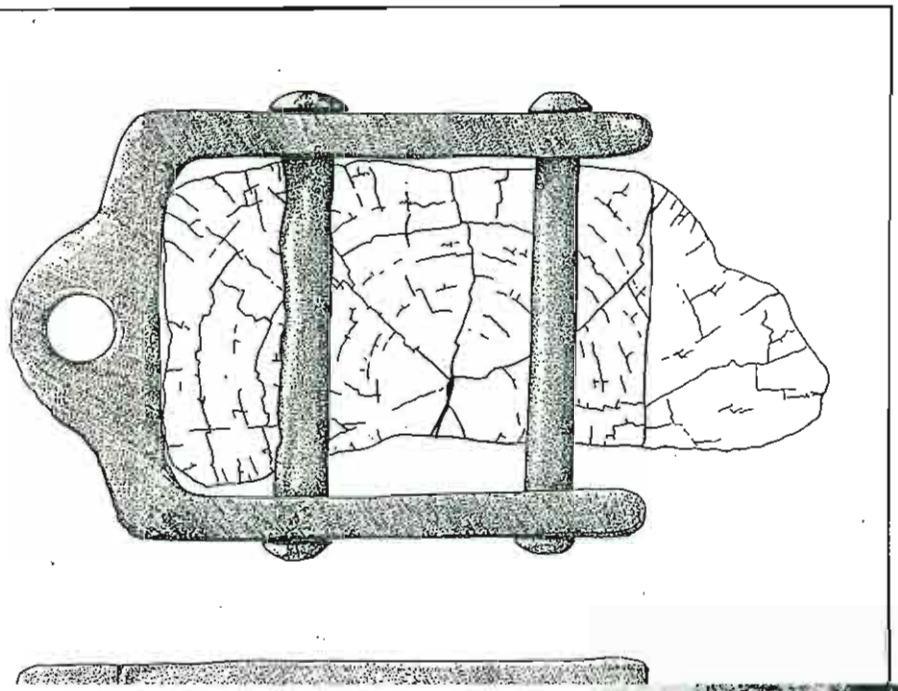
The feature designated Propeller Block stands to a height of approximately 1.5m. The propeller shaft opening is intact and the lignum vitae lining is still in situ. Traces of sheathing exist on the right edge.



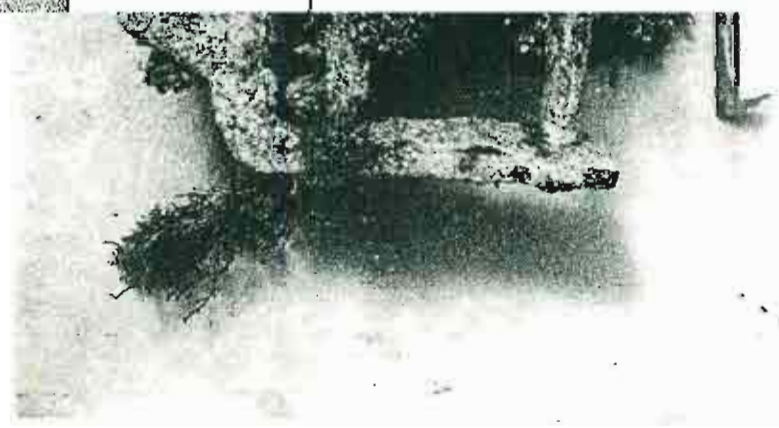


The gudgeon observed on site are shown in Figures 16 and 17. Gudgeons are hinges upon which the rudder turns. Those fastened to the ship are called braces, while those fastened to the rudder are called pintels.





Awhina Gudgeon
Figure 16 (above) and
Figure 17



9.0 Conservation

A comprehensive on-site conservation report is being prepared by Vicki Richards of the Conservation Department, W.A. Maritime Museum. Unfortunately it is still unavailable at the time of final compilation of this report.

Basic on-site data, as follows, was recorded as an integral part of the wreck examination:

Location	Ledge Bay GPS gives position as: Latitude 35°00 .843 (4) Longitude118°00.167 (89) (see site location details above)
Weather conditions	Wind mainly from the North, ranging from 5 - 20 knots
Sea conditions	Light to heavy seas
Swell	Light to frequently heavy
Current	No current observed
Description of wreck	Wooden hull with lead sheathing Boiler lying on top of site Part of hull exposed
Surface water temperature	14.5°- 17° C
Water depth over site	1.5 - 4m
Underwater visibility	0 - 15m depending upon the in the swell and surge conditions
Suspension material	Fine sand particles
Seabed topography	Flat sands and berms

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Swell	Light to frequently heavy
Current	No current observed

Degree of site exposure at time of visit	Boiler half-exposed at low-tide, remaining visible at high-tide Hull buried up to gunwales
Maximum height exposed	1.5m at the bow
Evidence of seasonal exposure variation	During the investigation considerable shifting of sand was observed resulting in the covering of various features, notably the water tank. It is known from W.A.M.M. records that this this site is usually covered during the summer months. Marine-growth cover of the wreck was ubiquitous
General sea-bed composition	Fine light-coloured sands
Depth to stable sea-bed	Not ascertained. As mentioned above, considerable mobility of sea-bed was observed with no obvious evidence of start of anaerobic layer

A number of artifacts were raised to undergo conservation treatment by the museum staff

During the course of the survey it became apparent that the sand surrounding the *Awhina* was mobile and subject to water movements. To better understand this phenomenon an experiment was designed. Parameters thought to contribute to sediment motion include sea-state and depth (both dictating surge strength), and tidal phase affecting net water transport .
Stations were established at five locations along the wreck site. These stations were the bow and stern extremities (where scouring was most evident), and starboard and port stations were chosen at midships. Measurements were then taken from these fixed stations to the sea bed, over a period of three days and a range of tide levels .
The evidence showed that sand was moving towards the starboard flank in the direction of wave propagation (westerly). The midships area on the port side was largely unaffected. Most change in sediment levels was seen to occur at the bow and stern. No other conclusions can be drawn from the data collected.

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General sea-bed composition Fine light-coloured sands

Depth to stable sea-bed Not ascertained. As mentioned above, considerable mobility of sea-bed was observed with no obvious evidence of start of anaerobic layer

A number of artifacts were raised to undergo conservation treatment by the museum staff

10.0 Future Site Management

The Awhina currently lies in a beautiful location whether one considers the vista above or below sea-level. There is vehicular access to Ledge Bay and a very short swim from the beach brings divers to the site, well marked by the fine example of an in situ boiler. The structural integrity of the boiler is, however, deteriorating and, judging by its present tendency to roll from side to side with the incoming waves, it is estimated that it may well collapse within 5-10 years.

The wreck is rich in a variety of marine life: fish, sponges and octopus among others. Significant portions of the wreck (including the keel) remain buried and so will probably remain relatively well preserved.

The site is one which could well be promoted for recreational divers because of the ease of access and the site's interesting features, although the problem of pilfering and gradual destruction of visible remains might arise. It should also be remembered that the site is said to be covered during the summer months, just the time when divers would be most likely to want to dive.

The extensive burial means that an excavation might uncover an amount of material intact. Useful evidence regarding the reported change of boiler might come to light in an investigation of the timbers on which the boiler presently rests.

Considering these issues and noting that the history of the *Awhina* is so well documented, it is proposed that the site should be left intact, its value in that form thought to be greater than the possibility of some new evidence as a result of excavation.

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11.0 Conclusion

It is felt that the two original objectives of the *Awhina* survey were met by the investigation outlined in this report.

The *Awhina* wreck site did provide a valuable training ground for the maritime archaeology students involved. The relative ease of access to the site enabled the maximum use of time available to be put to diving. The variability of weather conditions, and the swell and surge presented particular problems which had to be overcome in order to complete the on-site survey. The extent of visible remains meant that a number of features could be readily identified.

The field trip did result in the assimilation of both on-site and historical data which enabled the compilation of this report. Whilst we have attempted to analyse such data and have observed many points of interest, a number of other issues have been raised which certainly warrant both further research and analysis. These include further investigation of the effects of scouring, the boiler size and association with the *Awhina* and the obtaining of further constructional details.

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Table 1 Measurements for the Awhina's initial registration survey conducted by the Port of Auckland 1884/1885.

Builder's
Hector Macquarrie

Name of Port Mechanics Bay

Date of Meas[t] 12th Sept 1884

New { Status of new Ship or re-measured

87528 Official Number.

le 1. to be used in taking the Measurements at the Ship, and calculating the Tonnage under the Merch. Ship. Act, 1854.

hs from 50 ft. to 120 ft., and Midship Depth not exceeding 16 ft.

* Screw Steamer

Poop, or 6·8 ft. the common interval between Areas.

Viz. 16 ft.

Me. Lgth	Area 3.	Area 4.	Area 5.	Area 6.	Area 7.
	Ft.	Ft.	Ft.	Ft.	Ft.
Com. int. b	10·1	10·1	10·3	10·0	

No. of Bths.	Multipliers.	2·525		2·525		2·575		2·5		
1	1	Bths. Ft.		Bths. Ft.		Bths. Ft.		Bths. Ft.		Bths. Ft.
2	4	·5	17·5	18·4	18·4	18·0	18·0	16·4	16·4	
3	1	7	7·8	18·8	75·2	18·3	73·2	16·2	60·8	
		3	34·6	18·7	37·4	17·4	34·8	9·5	19·0	
		3	6·2	17·3	69·2	11·3	45·2	4·8	19·2	
		4	1·4	1·4	1·4	1·4	1·4	1·4	1·4	
			185·5		201·6		172·6		116·8	
			·84		·84		·86		·83	
			74 20		8064		10356		3504	
			840		16128		13808		9344	
			155 20		169·344		148·436		96·944	
			Ar. 3.		Ar. 4.		Ar. 5.		Ar. 6.	Ar. 7.

No. of Areas.	Multipliers.	Areas brought up. sq. ft.	Pdts.
1	1		
2	4	106·72	426·92
3	2	155·82	311·64
4	4	169·34	677·36
5	2	148·418	296·88
6	4	96·94	387·76
7	1		
			2100·56
			6
			1260 336
			1050280

Cub. ft. 1176336 ÷ 100 = Tons. 11763 / 18·33 / 6 / 13598 / Less crew space 131·12 / companion 10·86 \ 4·86 / Reg. Tonge.

Officers Space Cabin

Vessels the measurements of the actual Engine ons for the allowance for the propelling power, on the back of the form.

6·0 × 4·6 × 7·2 = 6·0 / 2760 / 7·2 / 5520 / 19320 / 198·720 · 1·90

Engine space 116·26

Galley Companion 5·6 × 8·0 × 6·9 = 5·6 / 44·8 / 400 / 44·80 / 6·9 / 403 20 / 26880 / 304·120 · 3·00

Crew Space 11·7 × 11·3 × 7·11 = 11·7 / 791 / 113 / 113 / 132·21 / 7·4 / 52884 / 92347 / 978·354 · 9·78 / 199 / 3·09 / 14·86

Im Vessels state if the Ship is of Iron, a Screw, or Paddle Power.

In the case of a Steam Vessel the allowance power, as calculated on the back of the form from the above.

Signed

Examined by

ed by Eyre & Spottiswoode,

Name of Port Auckland

Date of Meas[t] 12th Sept 1884

New { Status of new Ship or re-measured

87528 Official Number.

Poop, or other closed-in space.			
Viz.			
Me. Lgth.		ft.	
Com. int. betw. Bths.			ft.
No. of Bths.	Multipliers.	Bths. Ft.	Pdts.
1	1		
2	4	3	
3	1	2	

No. of Areas.	Multipliers.	Areas brought up. sq. ft.	Pdts.
1	1		
2	4	106·72	426·92
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6	4	96·94	387·76
7	1		
			2100·56
			6
			1260 336
			1050280

_____ } com. int. bet. Bths.

_____

_____ — lt. of space.

Cub. ft. 1176336 ÷ 100 = Tons. 11763 / 18·33 / 6 / 13598 / Less crew space 131·12 / companion 10·86 \ 4·86 / Reg. Tonge.

Crew Space 11·7 × 11·3 × 7·11 = 11·7 / 791 / 113 / 113 / 132·21 / 7·4 / 52884 / 92347 / 978·354 · 9·78 / 199 / 3·09 / 14·86

Engine space 116·26

In the case of a Steam Vessel the allowance for the propelling power, as calculated on the back of the form, is to be deducted from the above.

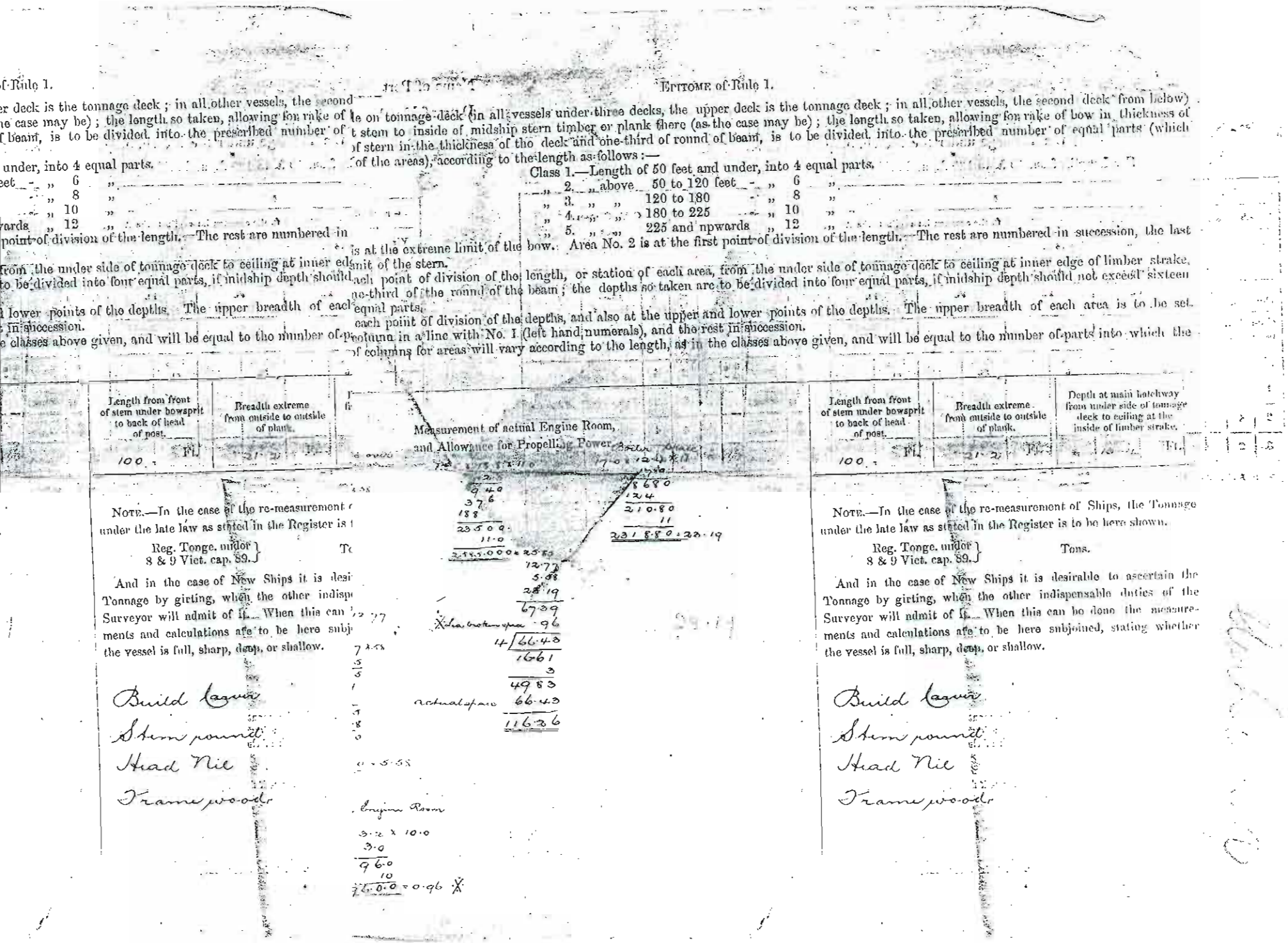
Signed

Examined by

Meas. Surveyor.

Draughtsman.

Table 1 Measurements for the Awhina's initial registration survey conducted by the Port of Auckland 1884/1885.



of Rule 1.

er deck is the tonnage deck; in all other vessels, the second
he case may be); the length so taken, allowing for rake of
f beam, is to be divided into the prescribed number of

under, into 4 equal parts.
eet „ 6 „
„ 8 „
„ 10 „
wards „ 12 „
point of division of the length.—The rest are numbered in

from the under side of tonnage deck to ceiling at inner ed
to be divided into four equal parts, if midship depth should
lower points of the depths. The upper breadth of each
in succession.
e classes above given, and will be equal to the number of

EPITOME of Rule 1.

(In all vessels under three decks, the upper deck is the tonnage deck; in all other vessels, the second deck from below)
le on tonnage deck (in all vessels under three decks, the upper deck is the tonnage deck; in all other vessels, the second deck from below)
t stem to inside of midship stern timber or plank there (as the case may be); the length so taken, allowing for rake of bow in thickness of
of stern in the thickness of the deck and one-third of round of beam, is to be divided into the prescribed number of equal parts (which
of the areas), according to the length as follows:—

Class 1.—Length of 50 feet and under, into 4 equal parts.
„ 2. „ above 50 to 120 feet „ 6 „
„ 3. „ „ 120 to 180 „ 8 „
„ 4. „ „ 180 to 225 „ 10 „
„ 5. „ „ 225 and upwards „ 12 „

is at the extreme limit of the bow. Area No. 2 is at the first point of division of the length.—The rest are numbered in succession, the last
mit of the stern.
ach point of division of the length, or station of each area, from the under side of tonnage deck to ceiling at inner edge of limber strake,
ne-third of the round of the beam; the depths so taken are to be divided into four equal parts, if midship depth should not exceed sixteen
equal parts.
each point of division of the depths, and also at the upper and lower points of the depths. The upper breadth of each area is to be set
column in a line with No. 1 (left hand numerals), and the rest in succession.
of columns for areas will vary according to the length, as in the classes above given, and will be equal to the number of parts into which the

Length from front of stem under bowsprit to back of head of post.	Breadth extreme from outside to outside of plank.	Measurement of actual Engine Room, and Allowance for Propelling Power.	Length from front of stem under bowsprit to back of head of post.	Breadth extreme from outside to outside of plank.	Depth at main hatchway from under side of tonnage deck to ceiling at the inside of limber strake.
100 Ft.	Ft.		100 Ft.	Ft.	Ft.

NOTE.—In the case of the re-measurement of
under the late law as stated in the Register is t

Reg. Tonge. under 8 & 9 Vict. cap. 89. } To

And in the case of New Ships it is desi
Tonnage by girting, when the other indispe
Surveyor will admit of it. When this can
ments and calculations are to be here subj
the vessel is full, sharp, deep, or shallow.

Build lagger
Stem pointed
Head Nil
Frame wood

NOTE.—In the case of the re-measurement of Ships, the Tonnage under the late law as stated in the Register is to be here shown.

Reg. Tonge. under 8 & 9 Vict. cap. 89. } Tons.

And in the case of New Ships it is desirable to ascertain the Tonnage by girting, when the other indispensable duties of the Surveyor will admit of it. When this can be done the measurements and calculations are to be here subjoined, stating whether the vessel is full, sharp, deep, or shallow.

Build lagger
Stem pointed
Head Nil
Frame wood

Figure 18 Photomosaic of the port profile of the *Awhina*

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REPORT - TIMBER IDENTIFICATION - *AWHINA*

Sample was collected by Maritime Archaeology Graduate Diploma students in July 1990. The sample was prepared by polishing to a 1200 finish (Arthur Dahl) and examined microscopically under both low (x10 → x40, end-grain) and high power (x50 → x400, radial and tangential longitudinal surfaces).

The wood is black and the absence of pores shows it to be a softwood. The absence of axial resin canals means that the sample is not a Pinus, Picea, Larix or Pseudotsuga species. The further absence of ray tracheids rules the sample out as a member of the Tsuga or Cedrus genus.

Features present (visible under high magnification) include:

i) little difference between early and late wood
ii) rather large diameters of the axial tracheids
iii) ray parenchyma have thin horizontal walls
iv) presence of alternate pitting in axial tracheids

The sample is thus a member of either the genus *Araucaria* or *Agathis*. The woods of these two groups are very similar and there is no certain way of distinguishing between them. Typical members of these groups are given below.

Araucaria: *A. angustifolia* (Bert.) O. Kuntze (Parana Pine; Brazil and Argentine): *A. araucana* (Mol.) K. Koch (Chile Pine; S. America): *A. bidwillii* Hook. (Bunya Pine; Queensland): *A. cunninghamii* Sweet (Hoop Pine; Eastern Australia; New Guinea).

Agathis (Kauris): South Eastern Asia, Australasia. *A. alba* Foxw. (East Indian Kauri; East Indies): *A. australis Salisb.* (New Zealand Kauri; New Zealand): *A. palmerstonii* F. Muell, and spp. (Queensland Kauri; Queensland): *A vitiensis* Benth. et Hook (Fijian Kauri; Fiji).

I.M. Godfrey

Ian Godfrey
CURATOR OF CONSERVATION

8/11/1990

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THE ATHENA (?) WRECK INSPECTION

ALBANY 1990

Acknowledgements

The members of the *Athena* team would like to extend thanks to the following people:

Bob Richards, ace skipper and tolerant man
The staff of the Albany Residency Museum
The staff at Albany Public Library
The staff at the *Albany Advertiser* 's office
Mr.Stan Austin and Mr.Gordon Norman for their invaluable information
Cos Coroneos for reference confirmation
Arthur Dahl

Figure List

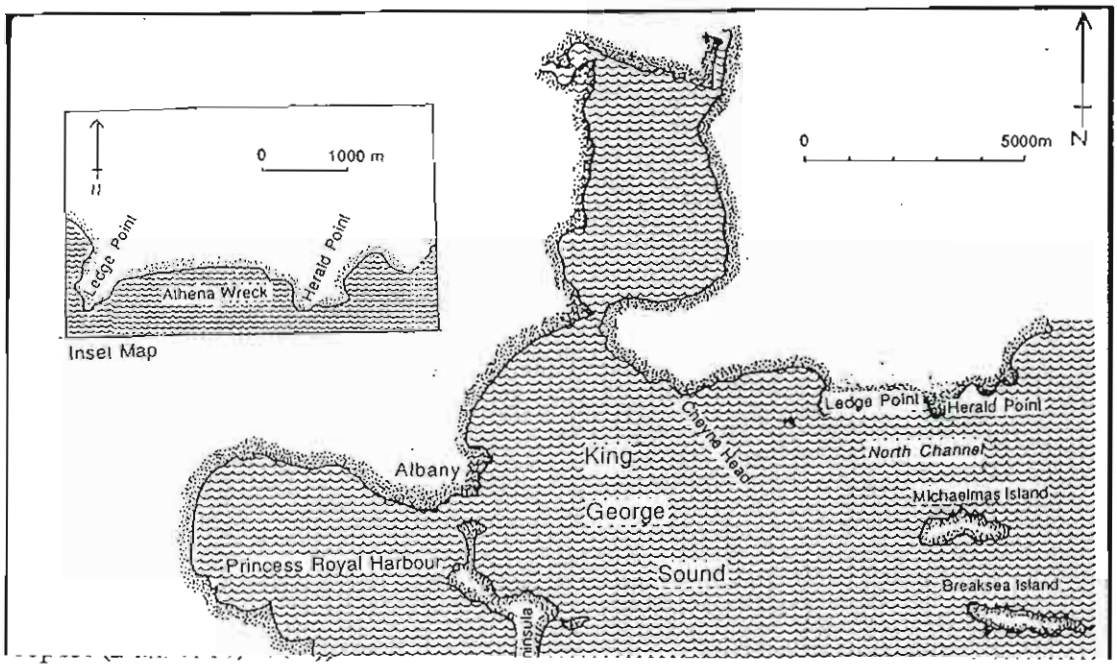
Figure List

Introduction

An inspection of a wreck, possibly that of the *Athena*, was carried out during the Western Australian Maritime Museum (W.A.M.M.)'s staff and student field trip to Albany in July 1990. Team members Madeleine Gauntlett, Sarah Kenderdine and Tim Smith were planning to carry out a comprehensive survey of the site and historiography of the vessel. Conditions near the site remained hostile throughout the two-week survey period, making the reconnaissance of the site difficult. Three attempts were made to approach the site with W.A.M.M.'s work-boat, *Seaspray*. On each occasion the swell conditions prevented access to the bay. For this reason it was decided to concentrate on the survey of the *Awhina* (outlined in a separate report (Dahl *et al*, 1990)).

Site Inspection

A brief lull in adverse conditions allowed a snorkel investigation of the site on 9, July, 1990. This resulted in the location of substantial remains in the western corner of a small bay, immediately west of Herald Bay (see Map 1). The vessel was found to lie at roughly 90º to the beach and in the surf zone. The timbers were concentrated in an ordered arrangement between low rocks. Transit photographs were taken to record the location of the site and added to W.A.M.M. file no. 113/79. A second snorkel inspection was made on the following morning although conditions had, once again, deteriorated. A hurried inspection was undertaken over a 20 - 25 minute period, whilst the *Seaspray* stayed out in the bay. The resulting sketch-plan records the principle arrangements and details of the site (see Figure 1).



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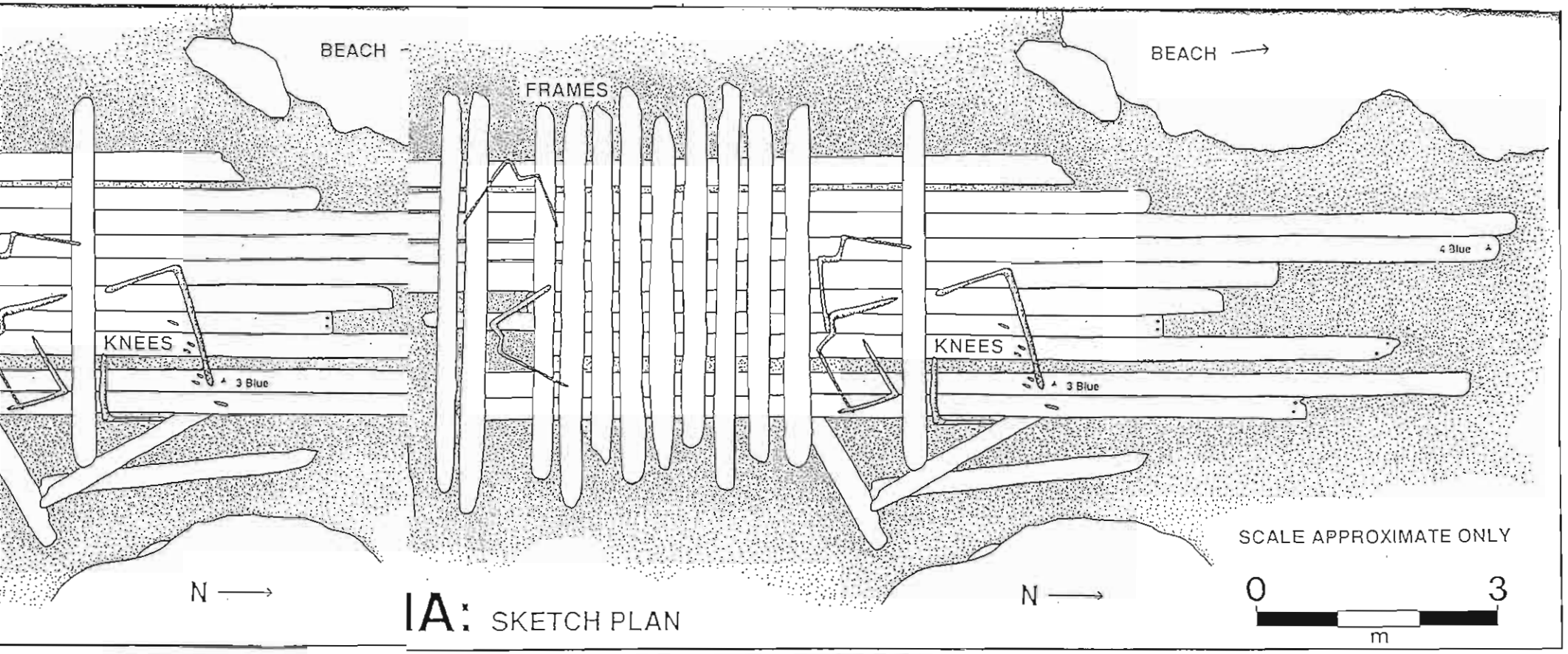


IA: SKETCH PLAN

Knees

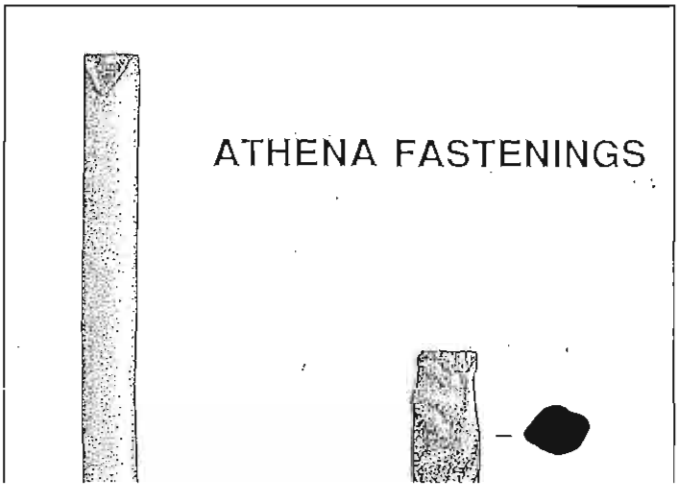
The metal knees are the most conspicuous elements of the wreck-site. Seven were observed although it is possible that more exist on the site. Two types are noted; single hanging knees and 'M-shaped' knees. Site conditions did not allow for the recording of the angles made by the bodies and arms of the knees. However, the details recorded in the site-plan (Figure 1) can be taken as a fairly good approximation. The angles of the 'M-knees' could give detailed information regarding the proportions of the deck-beams, clamps and frames upon which they rest (Desmond, 1984: 61.)

Timbers

Substantial timber remains survive from the vessel. Ten longitudinal timbers, with a representative section of 28 x 9 cm, make up the widest part of the wreck. A number of solid transverse members, with a representative section of 31 x 27 cm, span these timbers. The transverse members are thought to be frames whilst the longitudinal timbers may be outer planks or floor timbers. All timbers appeared quite sound and a sample was taken for further analysis (species identification had not been completed at time of writing).

Fastenings

Several examples of fastenings were recorded (Figure 2). The majority of these are long, cylindrical rods which extend vertically through the longitudinal timbers (Figure 2(a)). A number of these fastenings were noted in each timber, generally with two being spaced across the timbers width. The raised example was lying proud on these timbers and closely resembles a 'clinch bolt' (McCarthy, 1983: 18). It was almost certainly used to fasten these timbers to the frames, although visibility and time constraints prevented a certain association from being made. Chemical investigation of the metal composition has not been finalised although a copper alloy seems most likely.



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A different type of fastening was also noted (Figure 2(b)). This object (length 12.5 cm, maximum diameter 3 cm) was also found lying proud on the timbers, It closely resembles a portion of a wooden treenail, a long cylindrical 'pin' of hardwood used to fasten ships' planks to the main structural members (McCarthy, 1983: 13). The examination of the wood species has again, not yet been completed.

The timber remains, knees and fastenings constitute the only observed remains of the wreck.

Historical Background

The wooden vessel, *Athena*, (412 tons net registered) was built by Middle Dock Company, South Shields, Newcastle-upon-Tyne, England in 1868. The vessel was a carvel-built, three-masted barque (dimensions: 131 ft x 26.5 ft x 16.7 ft) which had a round stern, billet head and wooden frames (Lloyds Register of Shipping, 1869). It was a single-decked vessel, a new deck being fitted in 1880. The Athena was registered at Port Adelaide under British Colonial colours and owned by J.L. and W.A.Simpson. In 1885 the Fremantle Harbour and Lights records show evidence of a voyage from Mauritius to Fremantle and thence to Adelaide with a cargo of ballast (Fremantle Harbour and Lights Department file Dec 1881-Jan 1900). This may be taken as a representative journey. It would seem reasonable to assume that the vessel was regularly engaged in a mixture of international and country trade.

In June, 1897, after alterations to the vessel, the Athena started its service as a coal-hulk. In 1898 the *Athena* arrived in Albany under the ownership of McIllwraith and McEacharn Co., shipping agents (*Albany Advertiser*, 21 August, 1984).

Archival reports of the date of the *Athena*'s sinking are contradictory. The article in the *Albany Advertiser* of 21, August, 1984, states that the vessel

> was partly destroyed by fire and partly broken up near Gull Rock

on 13, March, 1912. Notes from a Mrs Bunuit held in maritime files at the Albany Residency Museum refer to an incident in 1948 when the Athena was blown onto a sandbank, and continue even more confusingly to state that it was

> sunk off Cape Vancouver in the 1930's

having been towed by the tug *Awhina*. Yet another inconsistency appears in the notes with the mention of a fire in the hull in 1943 which was extinguished by sinking the vessel. Mr Stan Austin was said to have been involved.

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In early 1968 a Western Australian Maritime Museum (W.A.M.M.) wreck inspection team reported a wreck presumed to be the Athena visible in depths of up to 2m in a small bay just west of Herald Bay. In August, 1984, Albany photographer Mr Ed Smit took a photograph (see cover of this report) of a wreck exposed after a storm. Details of the wreck were sent to staff at W.A.M.M. who identified it as the wreck inspected in 1968.

The wreck inspection conducted in July 1990 as the basis of this report was conducted on a site which appeared to be in a different position from that implied by Ed Smit's photograph. Unfortunately, conditions were such that it was impossible to take a comparative photograph of the inspected site in July: the site was lying under-water in the surf zone

Conclusion

The possibility of two distinct portions of hull remains could not be investigated due to the dangerous water near the rocks illustrated in the photograph (see title page). It also remains a possibility that either of these sites, or even both of the sites inspected in 1968 and 1990 are not, in fact, the remains of the *Athena*. Records indicate that a number of vessels foundered in this area. However, the 1990 inspection revealed the remains of a vessel which agrees in size and construction techniques to that of the Athena. It seems clear that further survey work would have to be carried out in suitable conditions in order to facilitate the positive identification of the site inspected.and to resolve the issue of whether or not there are actually two distinct sites in the bay. The remains inspected indicate that the site has very great archaeological potential.

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Western Australian Maritime Museum file number 113/79

REPORT: TIMBER IDENTIFICATION - *ATHENA* (ALBANY SHIPWRECK)

Samples were collected by students in the Maritime Archaeology Graduate Diploma course during fieldwork in July 1990. Samples were prepared by polishing to a 1200 finish (work done by Arthur Dahl). Transverse sections were examined microscopically under low power (x10 → x40) whilst radial and tangential longitudinal sections were examined using higher magnifications (x50 → x400).

Sample 1 - Planking

End-grain analysis revealed the following features:

i) pale yellow/brown colour
ii) rays narrower than pores
iii) vacicentric parenchyma
iv) intermediate/large pore size - large pores are visible to the naked eye without strain
v) ring porous vessel arrangement
vi) tyloses abundant
vii) number of pores = few/intermediate (approx. 5/mm²)

The above features are possessed by the following species (CSIRO Identification Key for Principal Commercial and Imported Timbers Used in Australia).

1. Ulmus sp. ("elm")
2. Quercus sp. ("oak")
3. Tectona grandis ("teak")
4. Juglans spp ("walnut")
5. Fraxinus spp ("ash")

Comparison with authentic samples and photomicrographs confirmed unambiguously that the sample is an Ulmus species (elm). The pore arrangement which consists of a single row of vessels in the pore ring identifies the wood as being Ulmus americana (American elm).

Sample 2 - Tree Nail

End-grain analysis revealed the following features:

i) rays are narrower than pores
ii) vacicentric parenchyma

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i) pale yellow/brown colour
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iv) intermediate/large pore size - large pores are visible to the naked eye without strain
v) ring porous vessel arrangement
vi) tyloses abundant
vii) number of pores = few/intermediate (approx. 5/mm²)

The above features are possessed by the following species (CSIRO Identification Key for Principal Commercial and Imported Timbers Used in Australia).

None of these samples matched the tree nail sample. All samples in the wood collection were examined and a match was obtained with Robinia pseudoacacia ("black locust"). The presence of storeyed parenchyma cells on the radial longitudinal surface of the tree nail confirmed its identification as R. pseudoacacia.

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8/11/1990

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