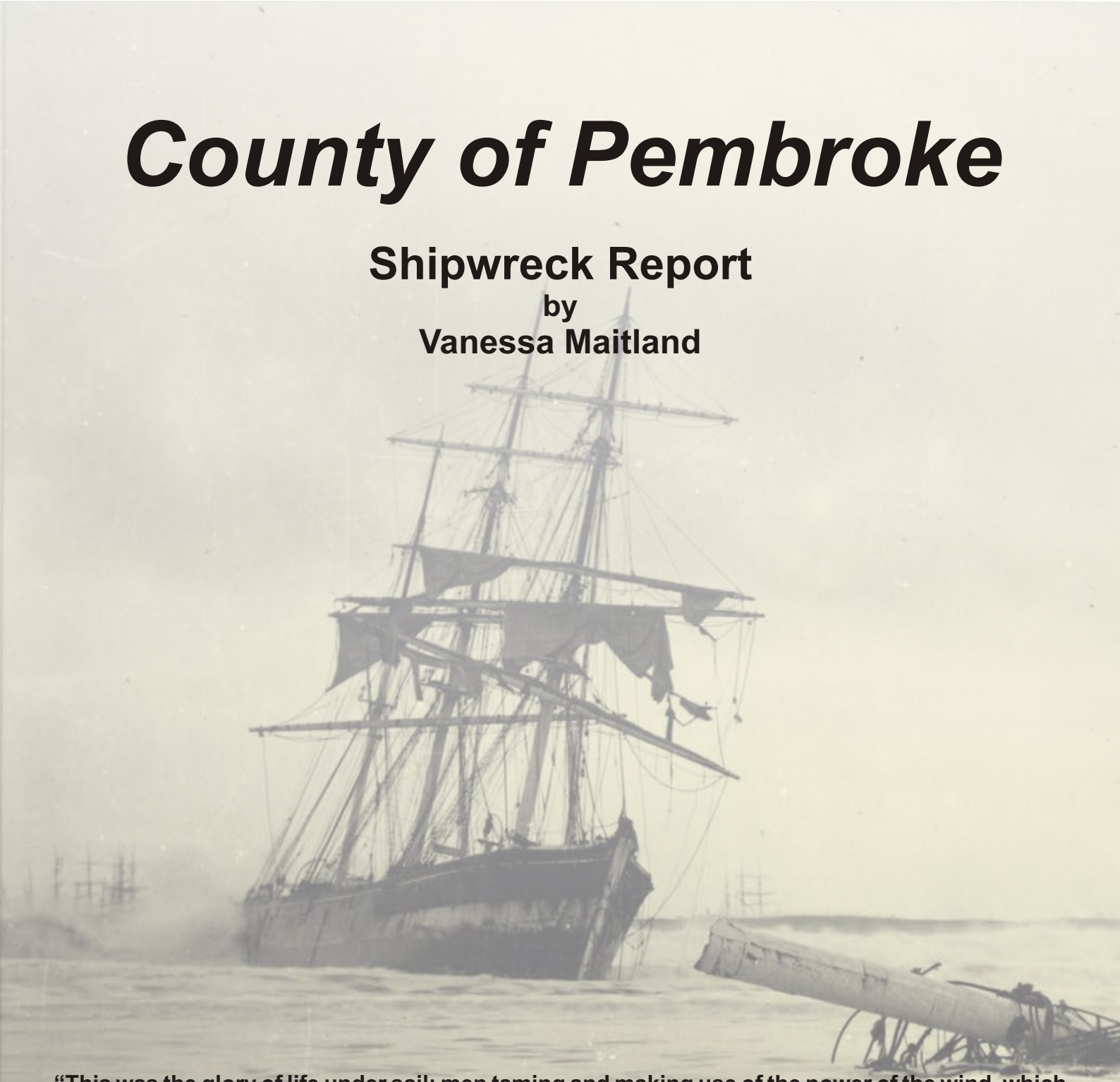
County of Pembroke

Shipwreck Report

by

Vanessa Maitland



"This was the glory of life under sail: men taming and making use of the power of the wind, which was the sailor's worst enemy and best friend. In all shifts of the wind, in its varying velocities, we caught it in our sails and made it propel us in the direction in which we wanted to go. We were never at its mercy, except when it sulked and becalmed us or headed us off. Any wind that blew was our servant not our master; yet, like a wild and dangerous beast, it had to be constantly watched or it would turn on us and destroy us."

James Bisset, apprentice aboard the *County of Pembroke* 1898 - 1903

Port of Ngqura
Eastern Cape
South Africa

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The Historical Background of the

County of Pembroke

Introduction

The earliest evidence for ocean-going vessels and navigation comes from the Mesolithic period (between 15 000 and 9 000 years ago) (Delgado 1997:324). The first recorded wreck on the coast of South Africa was a Portuguese vessel, only known as the 'Soares Wreck'. It ran ashore just west of Mossel Bay in 1505 and to date has not been found (Turner 1988:11).
The first recorded wreck in Algoa Bay was the *Doddington*, an English East Indiaman wrecked on Bird Island in 1755, 23 of the 270 people onboard survived.
Between 1755 and 1990 there have been in excess of 190 shipwrecks (excluding small craft) in Algoa Bay. These wrecks either lie where they sank, were refloated and sailed again, were towed away and sunk or blown up, others lie buried beneath reclaimed land (Turner 1988).

Wood and Iron Sailing Vessels

There was no sudden transition from the use of wood to the use of iron in building sailing vessels, it was a gradual transition as technology and economies impacted on ship builders.

The year 1850 is often seen as the end of the Age of Sail and the beginning of the Age of Steam. However, according to Harley (1970:262) some wooden shipbuilders in North America remained competitive with iron shipbuilders in Britain for about thirty years after 1850 until British iron shipbuilding began to dominate the market in the 1870's. In 1880, the year before the *County of Pembroke* was built, the net tonnage of iron ships built in Britain was 495 367 gross tons as opposed to only 20 000 gross tons built of wood (Graham 1956:77).
Harley (1972:262) explains this as "responses of a market mechanism to differential shifts in the supply curves of British iron and American wooden ships," that is, while labour costs remained equal in both processes, the cost of wood increased steadily while the cost of iron had dropped by 70% between 1860 and 1880. Improvements in building technology were equally responsible for the increase in iron ships (Harley 1970:263).

As iron is stronger than wood, its popularity as a shipbuilding material increased in the nineteenth century (Gardiner in Ho 2004:5). Iron increased the overall strength of the hull while decreasing the ship weight (Ho 2004:13). Nineteenth century ships were required to have maximum hull volumes and increased rigidity (Ho 2004:5). The standard British sailing vessel of the 1880s was a three-masted barque or square-rigger which was able to carry three times the cargo of the ordinary wooden sailing vessel of the 1860s (www.liverpoolmuseums.org.uk).
Improvements in sailing ship construction included: hand and steam appliances e.g. winches for working yards, sails and anchors, chain cables and wire rope and steel spars and yards, all of which allowed for more economical working of vessels with smaller crews (Graham 1956:79).

The benefits of using iron in shipbuilding were:

- Reduced construction time
- Added strength
- Increased hull volumes due to fewer support structures

The problems associated with iron shipbuilding were:

- New tool requirements

- Specialized labour in a new field
- Magnetic deviation to compasses caused by repeated hammering on the metal during construction which magnetizes and disrupts the magnetic field
- Increased susceptibility to corrosion and marine growth
- Increased lightning strikes

Some of the above problems were rectified by better iron production and proper electrical grounding (Ho 2004:7). However, wrought iron (*County of Pembroke*) continued to be used long after better steel was available because in 1885 steel cost 46% more than wrought iron (Graham 1956:87).

In the 1850's, on long voyages, where constant Trade or Monsoon winds could be relied on, the large wooden sailing vessesl could still carry goods more cheaply than any other vessels. While iron sailing vessels could stand almost unlimited driving in high seas, had more cargo space and were safer from fire, they were often slower than wood due to fouling on the keel and often ran months over schedule (Graham 1956:76).

It can be seen that various factors influenced the transition from wood to iron and steel, the process was not a sudden shift but rather a gradual phasing in of improved technologies.

Sail and Steam

It is often believed that the steamship was the impetus behind nineteenth century imperial growth; this however, ignores the role of the great sailing ships. According to Graham (1956: 74-75) the transition from sailing ships to steamers was not completed until three decades after 1850 because "as long as the routes to the Far East lay around the Cape of Good Hope, the commercial steamer could not hope to compete" although Harley (1970:263) says that it was not until the twentieth century that steamships dominated the long distance routes. Graham (1956:74-5) also states that the great sailing ships acted in "defiance of the Industrial Revolution" due to improvements in sailing ship construction and to the lengthy development phase of adapting iron ships to effective steam engines with adequate boilers, condensers and screw propellers.

Iron sailing vessel construction allowed these ships to survive years of strain and abuse and to continue to fill a niche market despite the inclusion of steamships in many company's fleets (Ho 2004:1).

Under the stimulus of competition, ocean-going sailing ships developed and had changed beyond all recognition by the 1880s and 1890s. Iron, and eventually steel hulls had been developed, rigging had been simplified and some ships had steam 'donkey' engines for hoisting sails, raising anchors and working pumps (Harley 1988:865).

As important as the increased shipbuilding technology was, so were the lack of improvements in the trade organizations and in port facilities and cargo handling. The quantity of cargo handled per day did not grow in conjunction with increased ship sizes; the cost of keeping larger ships in port for longer periods balanced the larger cargo carrying capacity (Harley 1988:865). According to Bisset (1958:136-7), "a sailing vessel spending, say, three months in port in Newcastle, three months in port on the west coast, and two months on a voyage in ballast to return to Newcastle was incurring expenses and eating up time unprofitably for eight months in a year! In such conditions, it was not surprising that shipowners were called skinflints because of the low wages and poor provisions in their vessels. The mercantile marine under sail was becoming less and less profitable, but this was not due to any lack of efficiency in the men or the ships at sea. The trouble was due to lack of port facilities and the

difficulty of picking up cargoes when and where they were needed."

The detailed study of currents and winds by Maury in the 1850's led to better routes and ergo the shortening of ocean voyages by sailing ships as better use was made of prevailing climatic conditions which contributed to sailing ships being more competitive with steamships (Graham 1956:82). Cargo ships didn't generally stop at any intermediate ports between England and Australia as owners wanted to save money on port dues and fresh provisions. This made for shorter voyages as it took full advantage of the trade winds and didn't require a lot of tacking to make the intermediate ports (Bisset 1958:44). Even when the Suez Canal opened in 1869, which reduced the distance between coaling stations, the traffic to the Bay of Bengal, the East Indies, South America and Australia was still carried out by the sailing ships which remained the most economical transport for the expanding trade in bulk commodities such as iron, coal, jute, rice, wool, nitrate fertilizer and wheat (Graham 1956: 81). Sailing vessels still chose the longer distance around the two Capes as there were heavy towage fees to get through the 'shortcuts' (Bisset 1958:45).

On average, a round trip was 24 000 miles – best conditions allowed three months on each leg plus a month in port to discharge and take on more cargo. The best case scenario was therefore a round trip of 8 months – in reality each round trip took between 10 and 12 months. With favorable winds the *County of Pembroke* could travel about 250 miles a day, on the above long journey she averaged about 130 miles per day. The calculations of a sailing vessel's speed were more complicated that of a steamer which travels a straight course and a sailing vessel often had to tack to make headway. Ergo, the actual distance traveled by a sailing vessel is greater than the straight line drawn on maps from port to port (Bisset 1958:43-45).

With the advent of the higher pressured marine engine, sail could only survive on the long distance routes as a carrier of cheap bulk cargoes (Graham 1956:82). With sailing vessels the cost per ton-mile was independent of the voyage distance while with steamships the cost per ton-mile increased with the distance of the voyage, this factor helps to explain the long co-existence of sail and steam (Harley 1970:263). Being the cheapest coal carrier, the sailing ship was instrumental in replenishing coaling stations for steamships around the world. Coal was also used as ballast on out-going voyages which meant lower freight rates (Graham 1956:84). Steam only achieved dominance on the long distance routes in the twentieth century (Harley 1970:264). Ironically sail was instrumental in its own demise.

The *County of Pembroke* – An example of the cost of sail

Table 1: *County of Pembroke* Itinerary and Cargo from 1898 - 1904

Date	Depart	Arrive	Cargo
12 Oct 1898	Liverpool, Britain		General merchandise
11 Jan 1899		Port Philip, Melbourne, Australia	Discharge
6 Feb 1899	Port Philip, Melbourne, Australia		1 200 tons wheat
11 June 1899		Queenstown (Cobh), Ireland	1 200 tons wheat
21 June 1899	Queenstown (Cobh), Ireland		1 200 tons wheat
June 1899		Antwerp, Belgium	Discharge
5 Aug 1899	Antwerp, Belgium		Ballast, in-tow
8 Aug 1899		Liverpool, Britain	Ballast
15 Sep 1899	Liverpool, Britain		General merchandise
17 Dec 1899		Port Adelaide, Australia	Discharge
Dec/Jan 1899/1900	Port Adelaide, Australia		Ballast
Dec/Jan 1899/1900		Port Pirie, Australia	Ballast
Dec/Jan 1899/1900	Port Pirie, Australia		Ballast
Dec/Jan 1899/1900		Port Germein, Australia	Ballast
19 Jan 1900	Port Germein, Australia		Flour and hay
19 Mar 1900		Algoa Bay, South Africa	Discharge
24 June 1900	Algoa Bay, South Africa		Ballast
21 July 1900		Newcastle, Australia	Ballast
8 Nov 1900	Newcastle, Australia		1 600 tons coal
20 Dec 1900		Carizal, Chile	Discharge
Early March 1901	Carizal, Chile		Ballast
April 1901		Portland, Oregon, U.S.A.	Ballast
June 1901	Portland, Oregon, U.S.A.		1 400 tons flour
Early Oct 1901		Queenstown (Cobh), Ireland	1 400 tons flour
Oct 1901	Queenstown (Cobh), Ireland		1 400 tons flour, in-tow
Oct 1901		Dublin, Ireland	Discharge
Oct/Nov 1901	Dublin, Ireland		Ballast, in-tow
Nov 1901		Liverpool, Britain	Ballast
23 Nov 1901	Liverpool, Britain		General merchandise
3 March 1902		Wellington City, New Zealand	Discharge part cargo
24 March 1902	Wellington City, New Zealand		General merchandise
28 March 1902		Dunedin, New Zealand	Discharge balance cargo
End May 1902	Dunedin, New Zealand		Ballast
13 June 1902		Newcastle, Australia	Ballast
5 July 1902	Newcastle, Australia		Coal
Sep 1902		Callao, Peru	Discharge
Oct/Nov 1902	Callao, Peru		Ballast
Oct/Nov 1902		Chincha Islands, Peru	Ballast
3 Dec 1902	Chincha Islands, Peru		Guano
17 Mar 1903		Falmouth, Britain	Guano
24 Mar 1903	Falmouth, Britain		Guano
27 Mar 1903		Antwerp, Belgium	Discharge
Apr 1903	Antwerp, Belgium		Ballast
Apr 1903		Liverpool, Britain	Ballast
Apr-Aug	Liverpool, Britain		
Apr-Aug		London, Britain	
Aug 1903	London, Britain		General merchandise
Oct 14 1903		Algoa Bay, South Africa	Discharge part cargo
Nov 14 1903	Wrecked, Algoa Bay		
22 Mar 1904	Towed to Coega River and sunk		
Compiled from Bisset 1958:27-228; The Eastern Province Herald 16-10-1903; Cape Daily Telegraph 23-03-1904.			

As can be seen in Table 1, in five years, the *County of Pembroke* only undertook four journeys (home port to home port): 10, 26, 17 and 3 months respectively (although the last trip was cut short when she ran aground). On her out-going journey she always carried general merchandise to the colonies and then performed tramp shipping duties (Ho 2004:15) between Australia, New Zealand, South Africa and the Americas carrying bulk cargoes, which was not a regular trade but rather freight taken on wherever available.

There were often lengthy stays in port, either due to the inadequate port facilities or due to the inability to find cargo. The lack of proper port facilities, as experienced by the *County of Pembroke*, is fully described in the section on Port Elizabeth, Algoa Bay, South Africa (pp. 37).

Attempts by shipowners to keep the sailing ship's costs down often had near tragic results, as in the following anecdote from the *County of Pembroke* as related by Bisset (1958:205-228). This incident occurred in the same year as the *County of Pembroke* was wrecked.

On the *County of Pembroke's* return from the Chincha Islands in December 1902, Captain Hughes did not stock enough provisions for the trip home to England and, with a full load of guano, the barque rounded Cape Horn.

> “Finally, he had neglected his last chance to take in provisions which could have been sent out to him in November, from the port of Pisco, in the supply steamer running to the Chincha Islands. Such carelessness, or meanness, may have been due to a failure on his part to examine the stores as the voyage proceeded; but more likely it was due to instructions given to him by the owners to avoid expense in ports. Such instructions, which were handed to shipmasters and marked 'Strictly Secret,' were drawn up in legal terminology designed to exonerate the owners and put the blame on the Master of the vessel for almost any mishap that might occur. They cast the utmost responsibility on the Master and at the same time restricted his freedom of action in a hundred different ways, especially in incurring expenditure.
>
> At the end of a voyage his accounts would be scrutinized by the owners and every item of expense questioned. It was impossible or very difficult to economize on port duties, towage, purchase of ballast, and various other working expenses on a long voyage; but the owners – who in most instances had never been to sea themselves – were intensely suspicious of any purchases made by shipmasters in foreign ports if these included provisions and stores. They had reason to believe that some shipmasters would make a profit on the side from such deals. For this reason the owners preferred to supply all necessary provisions and stores in the home port, under their own supervision, at the outset of the voyage."
>
> As the voyage progressed, the water became fetid as the guano cargo heated up and caused organic matter in the water tanks to ferment. Coffee ran out and was substituted with burned biscuits ground to a paste. Thereafter the ration of meat was cut down until it too ran out. The closest the crew came to mutiny, however, was when the ship ran out of tobacco. The crew began to break out in boils. The Captain and Mates carried revolvers; orders, while not openly disobeyed, were pursued so listlessly that the Mates decided it was useless to continue. There was an ample supply of biscuits, lime juice and water, even though the water was undrinkable. While in the doldrums, there were often showers of rain. The contents of one of the tanks was pumped into the other, a flat sail was rigged amidships with a canvas hose sewn into its centre, leading down into the tank supply pipe. This operation ended the water crisis. However, upon confrontation, all the remaining stores were shown to the crew. These supplies consisted of: a few tins of sardines and salmon, a few bottles of preserved fruit, biscuits and lime juice. It was agreed to put into the Azores Islands – two or three weeks away. The Captain agreed to share the remaining provisions equally between all crew and increased the ration

of biscuits from five to six a day, per man and doubled the ration of lime juice. The crew then decided to raid the slush casks. They tried to fry their biscuits in it but it made everyone very sick and so the experiment was abandoned. The men were starving and mutiny gave way to apathy. The Captain then decided to make straight for the home port, but stated that he would signal any ship seen for assistance. A few hours later a smudge of smoke was seen on the horizon. All sails were set to intercept her and the urgent two-flag signal N-V meaning 'We are short of provisions: starving' was sent up. The *County of Pembroke* was instructed to send a boat to the steamer.

"Then, as the Captain's gig and the dinghy were not available under davits, or suitable for such an occasion, he sang out, 'Launch the port lifeboat, Mister. Get away in her yourself, with six good men, and lay alongside the old hooker there, and ask them for anything they can spare in the way of food. Careful, now, Mister, careful. Take a bucket with you for bailing!'

'Lower away the port boat!' bawled the Mate. In our eagerness, all hands tailed on to the falls like one man, to hoist the boat off its skids. Now each man, it seemed, had the strength of ten, summoned from the ultimate reserve of human survival power; for, as we heaved, there was a horrible sound of splitting woodwork. Up came both ends of the boat, leaving the center fast on the skids! 'Holy mackerel!' groaned the Mate in despair. 'Belay everything, you damned idiots. This blasted boat is caked with a hundred coats of paint, and she hasn't been out of her chocks for twenty years. By the seven holy ducks that sat on King Solomon's grave, I'll choke the gizzard out of any cockeyed son of a sea cook who paints underneath a lifeboat in future without easing her out of the chocks. Now look what you've done, you awkward galoots. You've gone and beggared up the boat!'

The Mate's annoyance was due in part to the fact that boats were always painted under the supervision of the Mates. Moreover, the mishap in launching the boat had occurred in full view of the officers and crew of the steamer, which had now come to a standstill three hundred yards on our lee side. The Mate wanted to put on a smart show of seamanship, worthy of the great traditions of sail, as he believed the men in steamers were ignorant of the finer points of the nautical art.

'Where's the carpenter?' the Mate asked.

'Here, sir,' said Chips, who was standing by.

'Get your tools and chip away the paint under the starboard lifeboat, to free her from the chocks!'

'Aye, aye, sir,' said Chips, moving on the run to get his tools.

The Captain sang out from the poop, 'What's wrong, Mister?'

'Port lifeboat's holed, sir. Keel split and garboard strake buckled. She was secured to the skids with paint!'

The Captain considered the implications of this surprising statement, then sang out, loud enough for the men in the steamer to hear him, ''Bout ship and launch the starboard boat!'

Then he added, much more quietly, 'And see that she's free before you hoist her, Mister!'

It was nautically correct to put the barque about, to bring the starboard side to the lee, before launching the boat on that side in mid-ocean, the more so as the Captain now had doubts of the seaworthiness of the starboard boat, since neither of the boats had been put into the water in many a year. They had never been launched during the four years and five months that I had served in the *County of Pembroke* and perhaps had never been used since they were installed in 1881 – a serious breach of the Board of Trade regulations for the safety of lives at sea, which required lifeboats to be used and the gear tested at intervals, to insure that they would be available in an emergency.

Now, under the eyes of critical spectators, the famished crew of the *County of Pembroke* had to tail on, haul around the heavy yards on the mainmast, get the barque under way, then put her about and bring her to again 'in irons,' with the main yards backed once again to windward of the steamer, as previously, but with our starboard side toward her.

This manoeuvre required half an hour of hard work and skilled seamanship, which must surely have impressed the

onlookers, since they knew we were starving men. In the meantime the carpenter had freed the starboard lifeboat of the layers of paint which secured it to the skids.

All hands stood by the falls, and the mate gave the order, 'Take it easy, now, gently, haul away! We want her up all in one piece this time!'

When the boat was free and hanging in the davits, we swung her cautiously over the side and lowered her level with the rail. The Mate looked around at the miserable, half-starved specimens of humanity standing by and picked out six of the least enfeebled-looking – including myself – and ordered us to man the boat.

He instructed me to go forrard, to pull the bow oar and to tend the painter. He took his seat at the stern and shipped the rudder. When all was ready he gave the order, 'Lower way, gently now, gently. Keep her on an even keel.'

Gradually we took the water, with only a slight splash, and the Mate sang out, 'Let go!' We unhooked the falls, I cast off the painter, and, as I shoved her off with the boat hook, the seamen shipped their oars and we got under way. By this time, owing to years of exposure to tropic suns and sheer neglect, the planks began to open up at the seams, and she was leaking like a basket.

We bent our backs to the oars as smartly as possible in the circumstances, but this only opened her up more. By the time we were pulling her around under the steamer's stern, she was completely waterlogged, and we were sitting in water lapping up to the thwarts.

When we got alongside and made fast, the Mate set us to bailing out with a bucket and an old tin can; but, after a few minutes of this, we realized that it was like trying to bail out the Atlantic Ocean with a teaspoon, so we gave up the hopeless task. In the meantime the Mate was carrying out a shouted conversation with the Master of the steamer on the bridge.

She was the *S.S. Lowlands*, 2,000 tons, of West Hartlepool, bound from Palmero in Sicily to New York with a cargo of sulphur. Her Captain, an old sailing-ship man, sang out, 'Who's your Master, Mister Mate, and where are you bound?'

'Captain Hughes, Falmouth for orders, with guano, 145 days out from Callao!'

'Who are your owners?'

William Thomas & Co., Liverpool.'

'Welsh Thieves and Colonial Liars, eh? I've heard of their hungry ships. What provisions have you?'

'Only biscuits and lime juice. We are starving!'

'What provisions do you need to make Falmouth? How many hands have you?'

'Any food you can spare, Captain. We have twenty-one souls all told.'

'I'm fairly short of provisions myself, Mister Mate, but I'll let you have what I can spare. It's a damned disgrace. Your owners must be skinflints. They need showing up. I'll report you when I reach New York. My steward will put some provisions and stores overside to you. What's wrong with that leaky boat? Too long on the skids, eh?'

While this conversation was going on, all hands in the steamer were hanging over the rail, watching us with commiseration as we resumed despondently bailing out the boat. A seaman sang out, 'Have you any 'baccy, mates?'

Lew Owens answered, 'We have nothing except dog biscuits and slush! We've been eating slush.'

'God's truth, slush!' said the seaman at the rail. Another said, 'Your owners ought to be hung.'

Presently the steward of the steamer put his head over the bulwark rail, and said, 'I'm handing over forty pounds o' salt beef, fifty-six pounds o' potatoes, twenty pounds o' sugar, six tins o' condensed milk, ten pounds o' peas and four plugs o' tobacco. Will that do ye? It's all we can spare.'

'It's a godsend,' the Mate answered, fervently.

From the bridge, the Captain of the steamer sang out, 'I'll send the bill to your mangy owners at Liverpool.'

'Thank you, heartily, sir,' said the Mate"

All the stores were lowered over the side of the steamer, with the dry goods that couldn't afford to get wet, balanced on the crew's heads. The barque had in the meantime drifted close to the lifeboat which was threatening to sink at any moment. Hoisting the lifeboat back onboard proved a difficult task as she was filled to the gunwales with water and was only kept afloat by her buoyancy tanks and extremely dry timbers. These provisions still had to be eked out but the crew was kept alive by them. Ten days later all the provisions had once more run out and they were back to biscuits and lime juice. Bisset is entirely convinced that the vitamins in the lime juice kept them alive.

On arriving at Falmouth, the Captain was prodigal with supplies, laying on all sorts of fresh meat and green vegetables. The Captain of the *S.S. Lowlands* had reported its mid-Atlantic encounter and on both sides of the ocean, the newspapers were filled with the *County of Pembroke's* story. The seamen's societies and other benevolent organizations took up the plight of seamen and brought up other cases of starving crews on windjammers and severely censured the owners of these vessels. In addition political agitation by David Lloyd George, a Member of Parliament, led to the Board of Trade tightening up regulations and issuing a new scale of rations known as the 'Lloyd George' scale.

The above anecdote demonstrates the pressure that was applied to the Captains to ensure a profitable voyage and the pressure that sailing fleets were being put under by the increasing use of better and cheaper steamships as improved technology increased the distances that steamships could travel.

Doxford & Sons, Sunderland - Shipbuilders

The shipbuilding firm Doxfords was started in 1840 by William Doxford in Cox Green, the company built wooden sailing ships. The business expanded when William Doxford was joined by his two sons.The premises were moved in 1857 to Pallion, Sunderland. In 1870, the firm Doxford & Sons Ltd. acquired even larger premises nearby (Sunderland Echo 2008). It was here that the shipbuilders began their transition from wood to iron and steel ships. While they received numerous Admiralty contracts, their primary focus was always on merchant ships (Jones 1996). By 1904, the shipyard covered 38 acres and was divided into East and West Yards (Sunderland Echo 2008). Doxfords joined Thompson's, Laings and Greenwell's in 1961 to form the Doxford and Sunderland Shipbuilding and Engineering Group. This Group was taken over in 1973 and re-named Sunderland Shipbuilders Ltd. It merged with Austin and Pickersgill's in 1986 and closed in 1988 (www.sunderland.gov.uk).

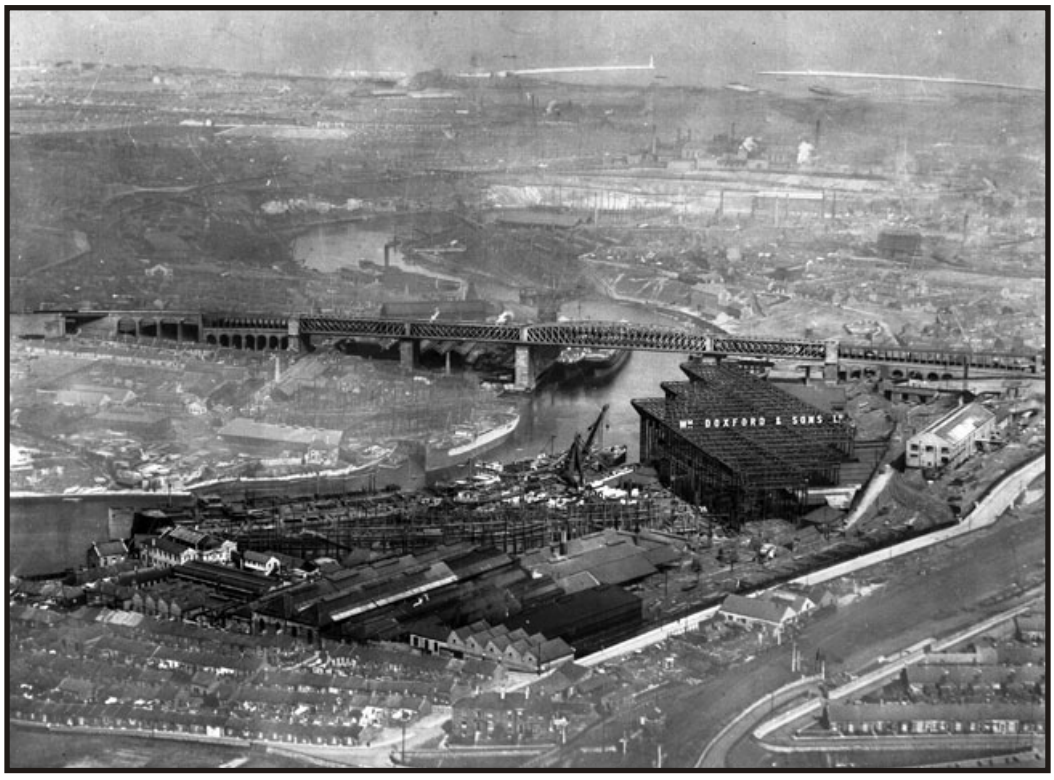


Figure 1: Doxford & Sons Shipyard 1921 (www.doxford-engine.com)

Figure 2: Doxford & Sons Shipyard. The launching of wooden vessels (www.doxford-engine.com)

Figure 3: The building of an iron or steel ship at Doxford & Sons (www.bbc.com)

William Thomas & Co., Liverpool – Shipowners

William Thomas was a teacher from Llanrhuddlad on Anglesey. He went to Liverpool to work in a shipping company; before long he became a ship broker. Initially he invested in schooners, small brigs, barques and auxiliary vessels built or managed by the other William Thomas of Amlwch. By the 1870s he had shares or was manager of several large wooden sailing ships (Cadwalader 2008).

In 1877 he had the first of the "County" ships built. There was a total of seven of these iron, full-rigged, ships and barques built at Liverpool and Sunderland. Over the next thirty years he had several large sailing ships and steamers built and took over the management of other North Wales owned vessels such as the "Cambrian" ships owned by Capt Thomas Williams of Criccieth (Cadwalader 2008). In 1898, when Bisset (1958:20-1) left Liverpool on the *County of Pembroke*, this Welsh company operated from Oriel Chambers, 14 Water Street, Liverpool.

W. Thomas & Co also owned several steam ships and had shares in, owned or managed many schooners built in Anglesey. The company continued to operate sailing vessels until 1915 when the remaining sailing ships were sold. William Thomas died in 1916 (Cadwalader 2008).

After the First World War his son formed a new company but still under his father's name and this struggled on into the 1930s. W. Thomas & Co was, like many other shipping companies, closed during the Depression (Cadwalader 2008).

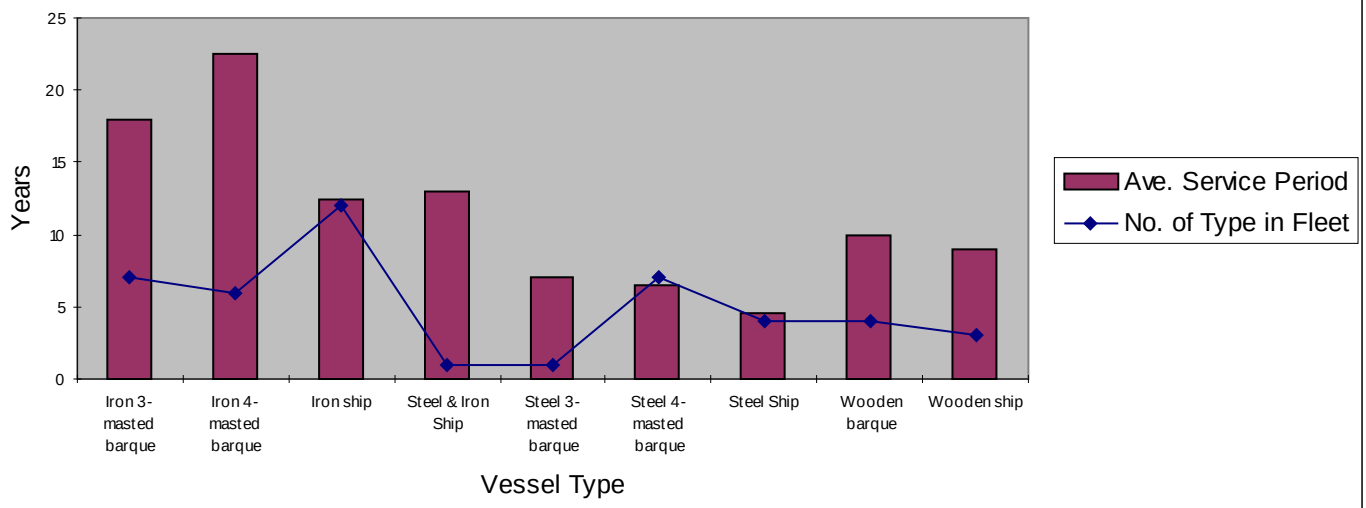
Table 2: W. Thomas & Co. Sailing Vessels

Name	Vessel Type	Tonnage	Date Built	Official #	Date Bought	Date Sold / Wrecked	Fate	Ship Age	Service Period
Afon Alaw	s.4.bk	2050	1891		1904	1915	Sold	24	11
Annie Thomas	s.sh	1764	1896		1896	1899	Wrecked	3	3
Boadicea	s.i.sh	1824	1887		1902	1915	Sold	28	13
British Commerce	i.sh	1417	1874		1883	1883	Wrecked	9	0
Buckhorn	w.bk	770	1875		1875	1876	Wrecked	1	1
Cambrian Chieftain	i.bk	1453	1885	91185	1896	1913	Sold	28	17
Cambrian Hills	s.sh	1760	1892	102060	1897	1905	Wrecked	13	8
Cambrian Monarch	i.sh	1306	1876	74552	1895	1907	Sold	31	12
Cambrian Prince	i.sh		1876		1896	1903	Wrecked	27	7
Cambrian Princess	i.sh	1350	1877	76493	1896	1902	Wrecked	25	6
Cambrian Princess	i.sh	2437	1884	87939	1903	1913	Sold	29	10
Cambrian Warrior	s.bk		1885		1897	1904	Wrecked	19	7
Cape Wrath	s.4.bk		1892		1900	1900	Wrecked	8	0
Carnarvon Castle	i.bk	729	1870	63259	1891	1894/7	Wrecked	24	3
Colony	i.4.bk	1694	1885	93697	1886	1915	Sold	30	29
County of Anglesea	i.bk	1067	1877	76506	1877	1905	Wrecked	28	28
County of Cardigan	i.sh	1292	1878	78749	1878	1911	Sold	22	22
County of Carnarvon	i.sh	1270	1877	76477	1877	1899	Wrecked	33	33
County of Denbigh	i.bk	1082	1877		1877	1880	Wrecked	3	3
County of Flint	i.bk	1083	1877	76505	1877	1905	Sold	28	28
County of Merioneth	i.bk	1065	1880	81341	1880	1906	Sold	26	26
County of Pembroke	i.bk	1065	1881	12743	1881	1903	Wrecked	22	22
Crocodile	s.4.bk	2371	1892	99400	1903	1915	Sold	23	12
Dominion	s.4.bk	2398	1891		1891	1899	Wrecked	8	8
Havelock	w.sh	1079	1875	72933	1875	1890	Sold	15	15
Holyhead	s.sh	2273	1889		1889	1890	Wrecked	1	1
James Kerr	s.4.bk	2281	1892		1902	1910	Sold	18	8
Julia	w.sh	973	1873		1874	1874	Wrecked	1	0
Kate Thomas	i.4.bk	1693	1885	91233	1885	1910	Wrecked	25	25
Lady Young	w.bk	595	1870		1872	1880	Wrecked	10	8
Malabar	w.sh	1291	1874		1874	1886	Wrecked	12	12
Marshall	s.sh	1785	1893		1900	1906	Wrecked	13	6
Menai	i.sh	1377	1880	81353	1884	1895	Wrecked	15	11
Metropolis	i.4.bk	1697	1887	93736	1887	1915	Sold	28	28
Nation	s.4.bk	2401	1891		1891	1892	Wrecked	1	1
North Star	w.bk	718	1871	64944	1872	1887	Sold	16	15
Ogwen	i.sh	1381	1880	81374	1884	1886	Wrecked	6	2
Pengwern	i.sh	1573	1882	86277	1888	1907	Wrecked	25	19
Portia	i.sh	1434	1868	56910	1883	1901	Sold	33	18
Principality	i.4.bk	1699	1885	91258	1885	1905	Wrecked	20	20
Province	i.4.bk	1874	1886	93709	1886	1910	Wrecked	24	24
Republic	s.4.bk	2347	1891		1891	1896	Wrecked	5	5
Rowena	i.4.bk	1934	1883	89500	1905	1914	Sold	31	9
Sappho/Sapho	w.bk	707	1870	69252	1873	1888	Sold	18	15
Wynnstay	i.sh	1601	1884	91148	1899	1910	Wrecked	26	11
Compiled from Bruzelius 2008; Cadwalader 2008; Fischer 1993:57									

Abbreviations Key

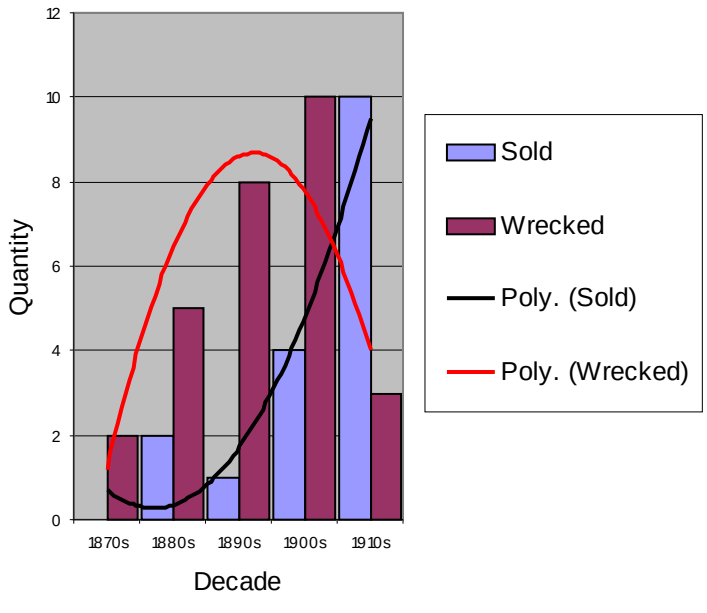
i.4.bk	Iron 4-masted barque
i.bk	Iron 3-masted barque
i.sh	Iron Ship
s.4.bk	Steel 4-masted barque
s.bk	Steel 3-masted barque
s.i.sh	Steel & iron ship
s.sh	Steel ship
w.bk	Wooden 3-masted barque
w.sh	Wooden ship

Chart 1: W.Thomas & Co. Vessel Types and Average Service Period



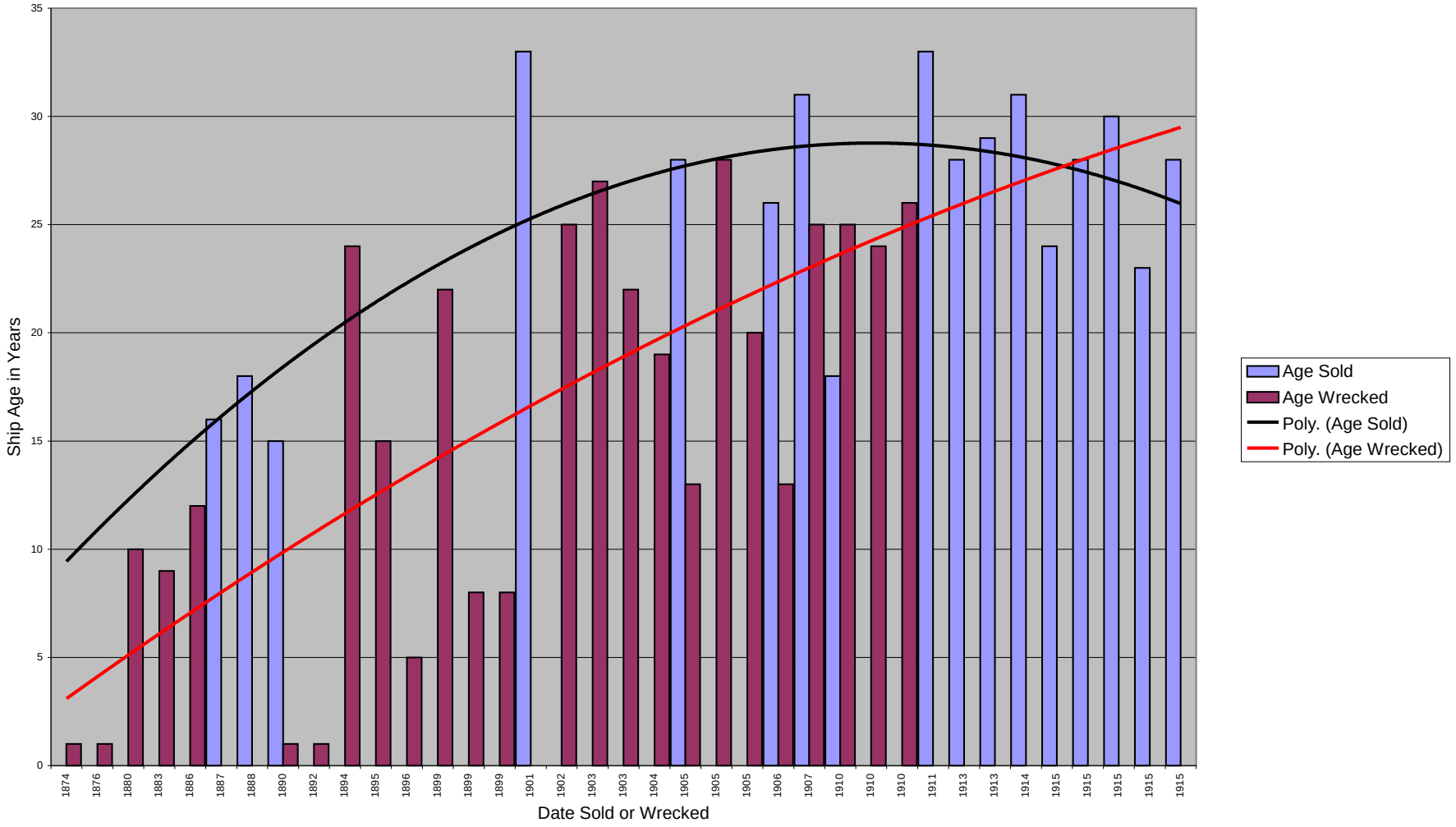
As can be seen in the above chart, iron vessels served the longest period in the fleet, followed by wooden and then steel vessels. There were 25 iron vessels in the fleet and they also had the highest average service period. There were 12 steel vessels, yet they had the shortest average service period and there were only 7 wooden vessels, yet they had the second longest average service period.

Chart 2: W.Thomas & Co. Sailing Vessel Fleet

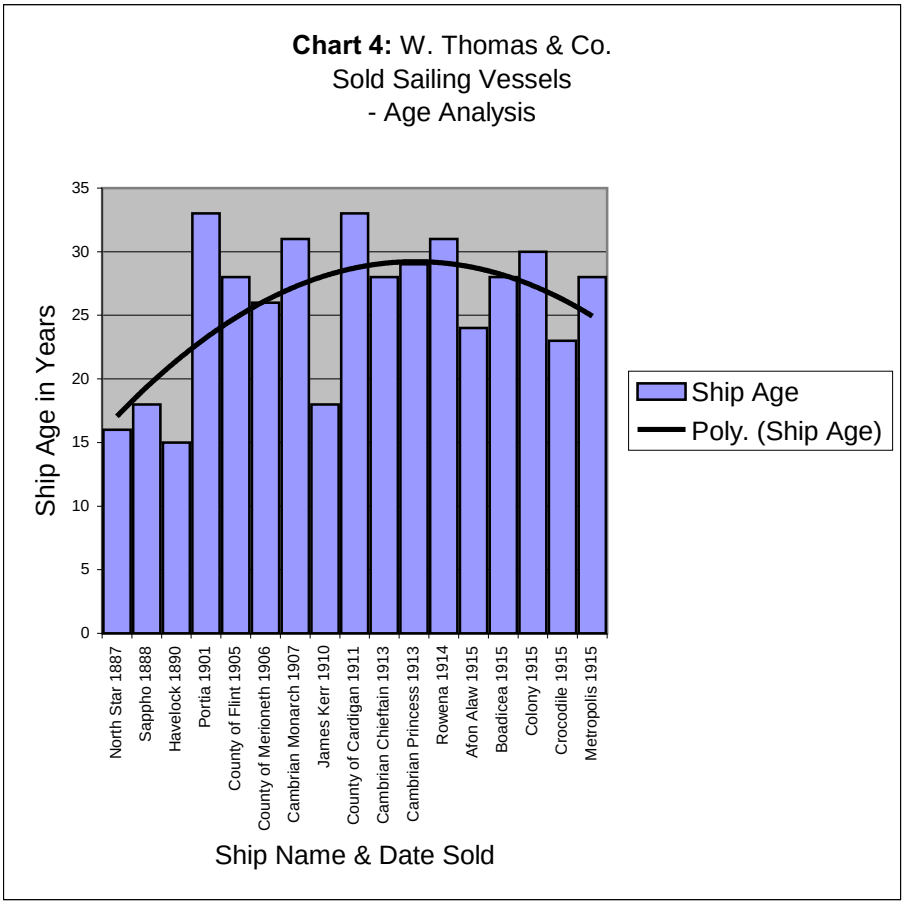


The above chart tracks, over 5 decades, the fate of the fleet; as can be seen wrecks increase over time until the biggest losses from 1900 to 1909 (the period of the *County of Pembroke's* loss). It could be that the high losses in this period prompted the shipowners to sell off their sailing fleet in the following decade and move fully into steam vessels.

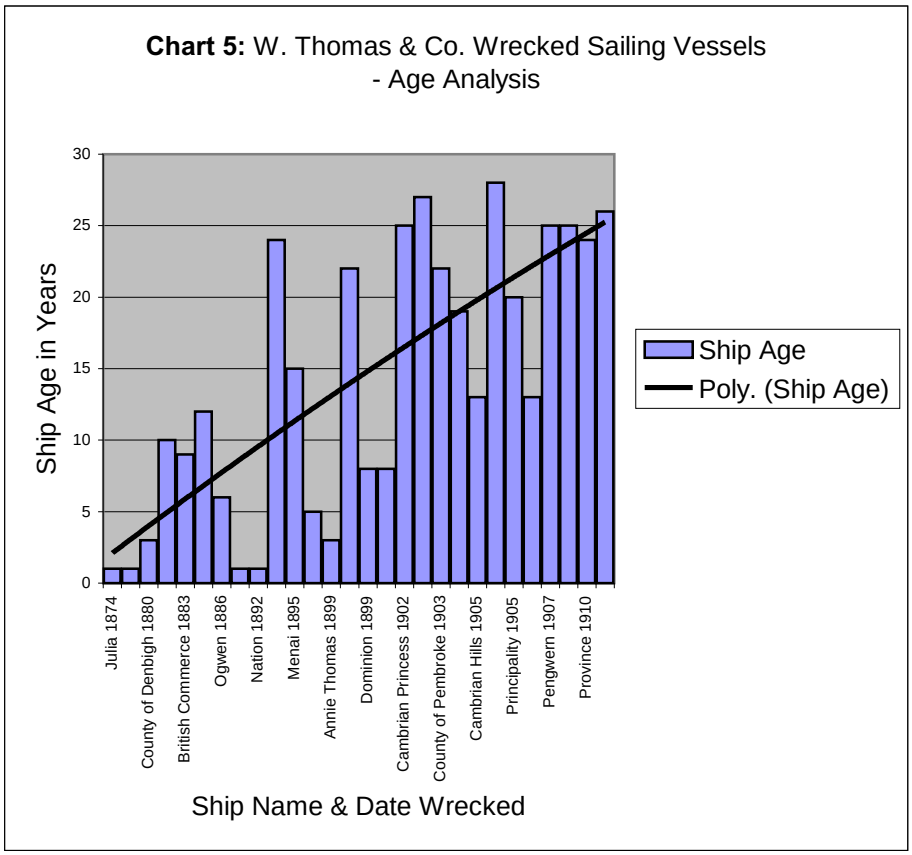
Chart 3: W.Thomas & Co. Sold & Wrecked Sailing Vessels - Age Analysis



This chart tracks the ages of the vessels in the fleet when they were sold or wrecked. As would be expected the fleet does age over time and this may have contributed to the increase in wrecks. In the first years a number of vessels were wrecked on their maiden voyages. This may have been due to the inexperienced W. Thomas employing inexperienced crews and masters. As the shipowner gained experience in running the company, the age of the vessels wrecked increased. It seems that the company only sold older vessels after they had been profitable enough but before their upkeep became prohibitive.



This chart demonstrates that the company only sold their vessels when they were over 15 years old.



This chart shows the age of wrecked vessels. Barring the four vessels that wrecked within their first year, it would appear that wrecks increased as the fleet aged. The increase in wrecks may be due to an aging fleet or it could have been caused by other factors such as: location, climatic conditions or Captain error. The *County of Pembroke's* Captain, John Parry, and the crew of his next command, the *Principality*, disappeared in 1905 on a voyage around Cape Horn.

Until further analysis is undertaken, the trends evident in these charts tell us that William Thomas & Co. lost more ships each year, which was sufficient motivation for them to sell off the entire sailing fleet by 1915.

Liverpool – Port of Registry for the *County of Pembroke*

Liverpool is very close to the mouth of the Mersey River, on the west coast of England, where it enters the Irish Sea. However, it has a huge tidal range of eleven metres. When ships were small, they would rest on the mud during low tide but improved ship construction led to much larger ships. At first they anchored in the river and were off-loaded by boat, which was an expensive, time-consuming operation. In addition, strong winds, swift currents and enormous shifting sandbanks impacted negatively on large ships. It was imperative that the ships docked where they were safe. (www.liverpoolmuseums.org.uk).

Liverpool, on the west coast of England, was an ideal place for docks. It was close to local markets in Ireland, Scotland and Wales and convenient for the American trade. The docks were located in the town centre close to administrative amenities. The town and docks were run by the same people, it was therefore in their best interests to see the docks developed. In addition the high tidal range meant that the river could accommodate larger ships than most other ports (www.liverpoolmuseums.org.uk).

The following is a description of Liverpool in 1898 by Bisset (1958:5):

> "The Liverpool docks, extending for seven miles along the northern shore of a well-sheltered tidal basin one mile wide, were thronged with sailing vessels and steamers. The dockside hummed with activity by day and by night, except on Sundays, when all work in the port came to a standstill.
> At any season of the year, there would be not less than a hundred overseas vessels at anchor or docked in the Mersey, discharging or taking in cargoes or awaiting charters. The idea of a 'quick turnaround', especially for sailing vessels in a terminal port, had not yet occurred to ship-owners or stevedores. The windjammers could not arrive or depart on fixed schedules and usually remained in port for a month, or longer, between voyages."

When the *County of Pembroke* returned to her home port, she was put into dry dock. Her bottom was scraped and painted. Permanent crew worked at chipping and painting overside, cleaning and painting inside the hold, painting the bulkheads and deckheads of the compartments under the poop and painting inside the deckhouse (Bisset 1958:115).

Figure 4: Sailing vessels berthed in George's Dock, Liverpool, 1885-1910 (Bisset 1958:16)

Sir James Gordon Partridge Bisset

James Bisset was born on 15 July 1883. At the age of 15 he convinced his father to pay for his apprenticeship on one of W. Thomas & Co's sailing ships. In 1898 he embarked on the *County of Pembroke* and spent the next four and a half years mastering the basics of sailing vessels. After leaving the *County of Pembroke*, he shipped aboard the *County of Cardigan* where he was the second mate. A year later, he realized that his future lay in steam. After putting in the necessary shipboard time on steamers, he sat for his Master's Certificate (Bisset 1958).

In 1907 Bisset joined the Cunard White Star Line where he served on various ships including: *RMS Caronia*, *Ultonia*, *Umbria*, *Ivernia*, *Brescia*, *Phrygia*, *Carpathia* and *Aurania* (Robins:www.merchantnavyofficers.com). His first command for Cunard was *RMS Aurania* (Rowe:www.freepages.genealogy.rootsweb.ancestry.com/~rowerowe/sirjames.htm).

Bisset was the Second Officer aboard the *Carpathia*, the first ship to arrive on the scene when the *Titanic* went down in 1912 and they rescued all 703 survivors. Bisset went on to become a Commodore of the Cunard White Star Line (Robins:www.merchantnavyofficers.com).

Bisset also joined the Royal Naval Reserve and trained on the *HMS Hogue* (Robins:www.merchantnavyofficers.com). During World War I (1914-1918) he commanded destroyers. During World War II (1939-1945) Bisset commanded the *Queen Mary* and *Queen Elizabeth* (Rowe:www.freepages.genealogy.rootsweb.ancestry.com/~rowerowe/sirjames.htm).

Bisset married May Hodgson in 1913; they had no children. He died on 28 March 1967 (Rowe: www.freepages.genealogy.rootsweb.ancestry.com/~rowerowe/sirjames.htm).

Bisset wrote the following books:

Lifeboat Efficiency: Illustrated Guide to Examinations. Liverpool: C. Birchall & Sons. 1912.

Ship Ahoy! Nautical Notes for Ocean Travellers with Charts and Diary. Liverpool. Charles Birchall. 1920s.

Sail Ho! My Early Days at Sea, New York, Criterion Books. 1958

Tramp and Ladies My Early Days in Steamships, Angus & Robinson, 1959

Commodore War, Peace and the Big Ships, Angus & Robinson, 1961

The book Sail Ho! My Early Days at Sea, documents the first five and a half years of Bisset's life as a seaman. Most of that time was spent on the *County of Pembroke*. His account gives everyday details of the barque and life onboard, he describes the structure and working of the vessel. It was an invaluable guide in understanding the site.

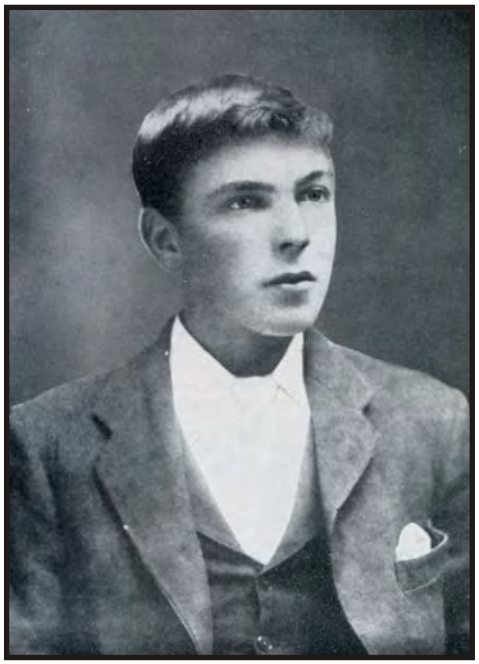


Figure 5: James Bisset, at the age of 16, as an apprentice aboard the *County of Pembroke* (Bisset 1958:114)

Port Elizabeth, Algoa Bay, South Africa

While Port Elizabeth is much smaller than Cape Town, it was actually a primary center of trade and finance between 1850 and 1900, it was the 'Liverpool' of the Cape and in many aspects the key center of the Cape economy (Mabin 1986:275).

In this period the Cape's economy was largely controlled by a commercial elite of merchants, accountants, agents and lawyers. Trade and services were mainly the concern of small enterprises. Port Elizabeth merchants always had financial and other links directly with Britain. In the 1840s, half the ships leaving Algoa Bay headed straight back to Britain (Mabin 1986:275).

Between 1873 and 1883, £300 000 was spent on the jetty in Port Elizabeth while £500 000 and £1 000 000 were spent on harbour improvements in East London and Cape Town respectively (Mabin 1986:289). Between 1890 and 1895 Port Elizabeth received a fifth of the amount allocated to Cape Town for harbour improvements (Mabin 1986:301). The greater capital investment in Cape Town allowed the harbour to develop and this eventually caused the trading focus to shift away from Port Elizabeth. In addition Cape Town's harbour fees were half of those in Port Elizabeth and the government would not allow Port Elizabeth to lower their charges (Mabin 1986:289, 301).

On the 19th of January 1900 the *County of Pembroke* set sail for Algoa Bay from Australia. Under charter to the military authorities they carried a cargo of flour and hay for the South African War. This journey was particularly difficult as the ship was sailing into the westerlies, they had to tack to Mauritius and then pick up fair winds on the old East India trade route (Bisset 1958:126-7).

Bisset's (1958:128-131) first hand account of Algoa Bay in 1900, firstly gives a description of the area and secondly, highlights the problems encountered by sailing ships in this port.

> “Algoa Bay is at the southeastern corner of the African continent, 420 miles by sea eastward of Cape Town. It is a crescent-shaped bay, forty miles wide at its mouth, facing southeast, and therefore sheltered from the prevailing westerly weather, but offering no protection from easterly or southeasterly winds. When we arrived, there were over forty sailing vessels and a dozen tramp steamers anchored in the bay, all loaded, like our barque, with military stores, and waiting their turn to discharge their cargoes with the limited lighterage facilities available.
> The town of Port Elizabeth, on the shore of a cove in the lee of Cape Recife, at the southwestern end of the bay, had a pier and limited wharf accommodation, inadequate for the sudden increase of shipping that converged on Algoa Bay with troops and war supplies from Britain, Australia, and India. This port was nearer than Cape Town to the scene of hostilities in the Transvaal and the Orange Free State; but in the early stages of the war, as historians agree, there was much muddle and 'absent-mindedness' in Britain's conduct of the military operations, including the organization of supplies. Though ships of all kinds had been sent to Algoa Bay, no one had thought of the need for increased facilities for unloading cargoes. With up to sixty vessels in port, only two or three could be berthed at the pier, and more were arriving almost every day.
>
> The *County of Pembroke* was anchored two miles from the pier. We lay there in idleness for two months before we could obtain lighters to begin discharging our cargo; and that was possible only because the hay and flour we carried were urgently demanded by the Australian troops on shore. Other ships which had arrived before us had been lying at anchor for four or five months without being able to obtain lighters. It was out of the question for a sailing vessel to be berthed at the pier, unless she was carried troops, and then she was berthed for only a few hours while they were

disembarked. Priority in discharging cargoes, either at the pier or by lighters, was given to steamers, because of the higher rate of demurrage (a charge by port authorities for failure to load or remove goods within the prescribed time) on steamers than on sailing vessels. Moreover, the windjammers were a nuisance to the harassed port authorities, as they had to take in ballast when their cargoes were discharged. It put an extra strain on the inadequate labour resources of the port to procure, cart, and deliver the ballast to the waterfront, to be lightered out to the ships progressively as their cargoes were discharged into the lighters. To make matters worse, lightering was impossible when easterly or southeasterly gales raised seas in the open bay where the ships were anchored, and then there was a risk that vessels would drag their anchors and be driven ashore. (The *County of Pembroke*, in 1904, one year after I left her, ended her days at Algoa Bay, where she was driven ashore in a SE gale and became a total wreck.) At such times lightering was suspended for several days. In these disorganized conditions we lay at anchor for three months before we were able to discharge our cargo of 1,200 tons and take in 300 tons of stone ballast and clear out.

Figure 6: Wet workers loading a lighter in Algoa Bay. (Urquhart 2007:85)

Figure 7: Lighters warped on the Landing Beach. (Urquhart 2007:85)

For the first two months, while we were waiting for lighterage, the 'matelots' of the fo'c'sle had no chance to go ashore. The Mates kept all hands busy overhauling gear aloft, chipping rust, painting, and endeavouring to scrape off the barnacles which accumulated on the hull at and below the waterline. Few fresh provisions were taken in, and we had the same monotonous diet as at sea.

The apprentices were more fortunate than the fo'c'sle hands, as it was our task to row the Captain ashore in the gig whenever he had business to transact, and this was very frequently. On almost every fine day we were ordered to get the gig ready. This required an hour's work before breakfast. All paintwork had to be scrubbed. The thwarts and oars had to be sand-and-canvased 'as white as a hound's tooth' (the Old Man's favorite saying), and the brass tholepins and the yoke on the rudder polished till they shone like gold.

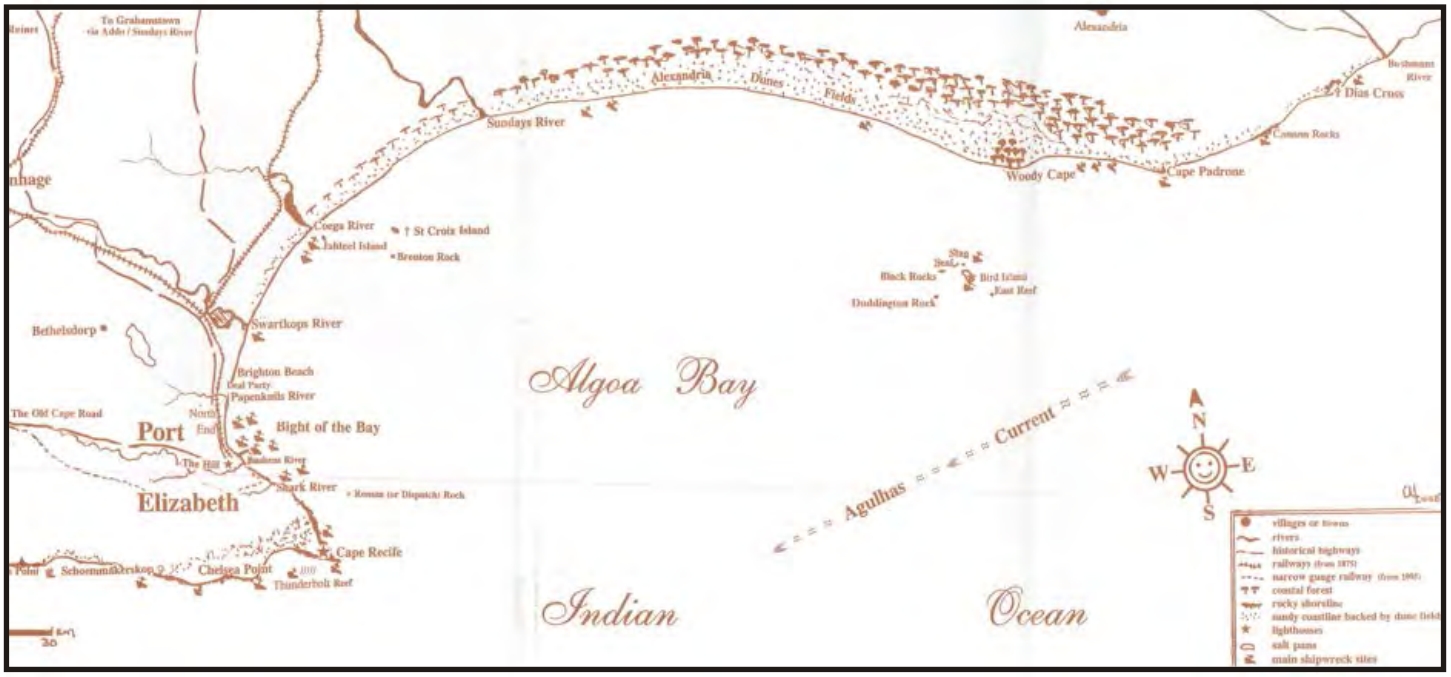
With so many ships in port and so many critical eyes ready to find fault, all the captains vied with one another to have the smartest gig, and ours took a lot of beating. When everything was spick and span – including ourselves in clean white shirts and dungarees – we would bring the gig alongside the gangway, and the Captain would embark and take his seat in the stern, but not before casting a severely critical eye over the boat to detect any speck of dirt or tarnish that may have escaped our notice.

The boat was a four-oared gig. It would have been beneath the Old Man's dignity to be rowed ashore by less than four apprentices. Captain Williams was suitably garbed to uphold his status as a Master Mariner. He was smallish, rotund, and rubicund, with twinkling blue eyes, but had a devil of a temper when aroused. For going ashore he usually wore a blue serge suit, with a high white collar and cravat with a gold pin and a heavy gold watch in his waistcoat pocket, secured by a gold chain across his stomach…The Captain's trousers were bell-bottomed, and on his head was a brown billycock hat, well brushed and worn at a rakish angle."

As the lighters removed the cargo, the vessel rose in the water, exposing the marine growth on her hull. The crewmen had to scrape the grass and barnacles off as far as they could reach. The ballast was then brought out and hauled

in to the hold with tackles and baskets. Their ballast on this occasion consisted of broken bricks, rubble and cement blocks that were salvaged from a demolished building. This ballast was difficult to spread and stow evenly. Several days were spent tomming it down with planks and battens (Bisset 1958:134-5).

"On 24th June, 1900, after ninety-three days in port, we gladly heaved up the anchor and set sail, bound for Newcastle on the east coast of Australia – a run of 6,000 miles – in ballast, to procure a cargo of coal." (Bisset 1958:135)



Map 1: Map of Algoa Bay, showing North End Beach where the *County of Pembroke* was wrecked and Coega River Mouth, where she was eventually towed to and sunk (Drawing C. Urquhart)

Figure 8: Port Elizabeth Landing Beach, circa. 1867 (Harradine 2002:32)

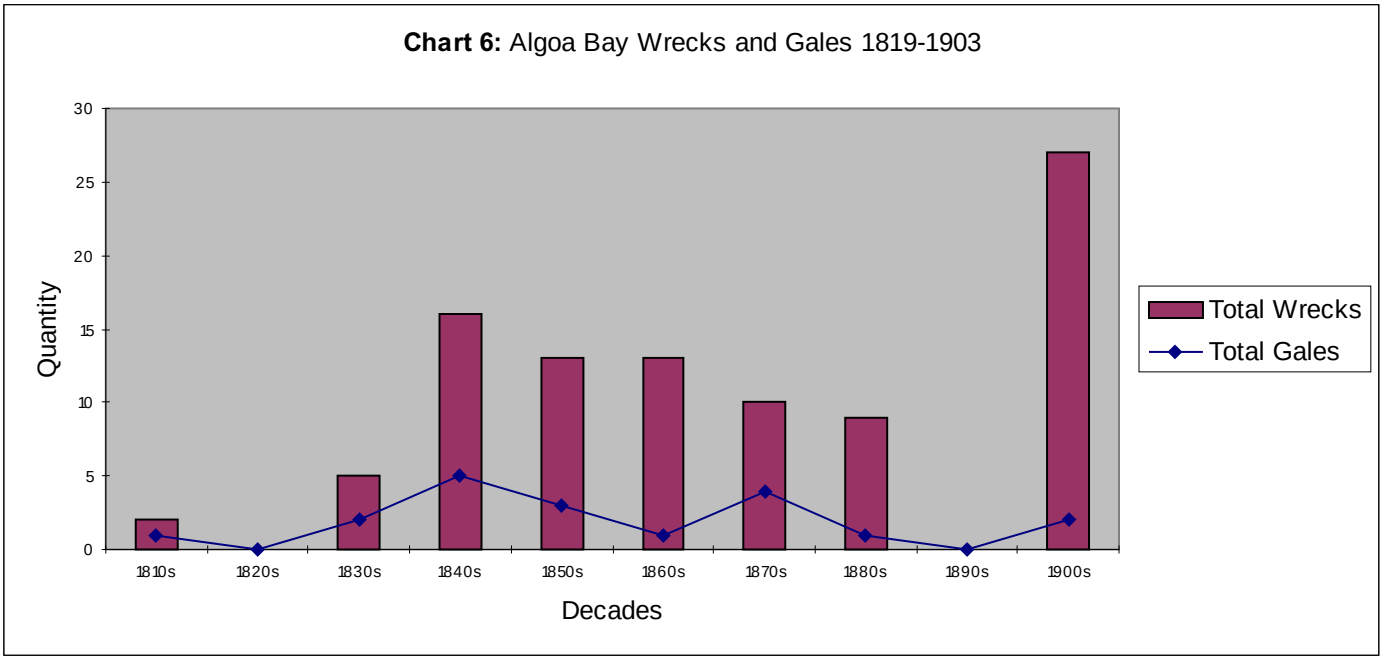
Algoa Bay – Major Recorded Gales as Experienced by Shipping

According to the Africa Pilot (1967:98) Algoa Bay is subjected to south-easterly gales between October and April, but safe anchorage could be found in the south-west corner of the Bay. Easterly and south-easterly gales are the only hazard in the bay and during these gales heavy and dangerous breaking seas roll in, but vessels with sufficient cable out could generally ride easily. The beginning and end of summer are usually when the worst weather hits Algoa Bay. Black South-Easters are particularly violent storms, accompanied by heavy rain but they often don't last long, they are most frequent in October and November (Sailing Directions [Enroute] 1986:27).

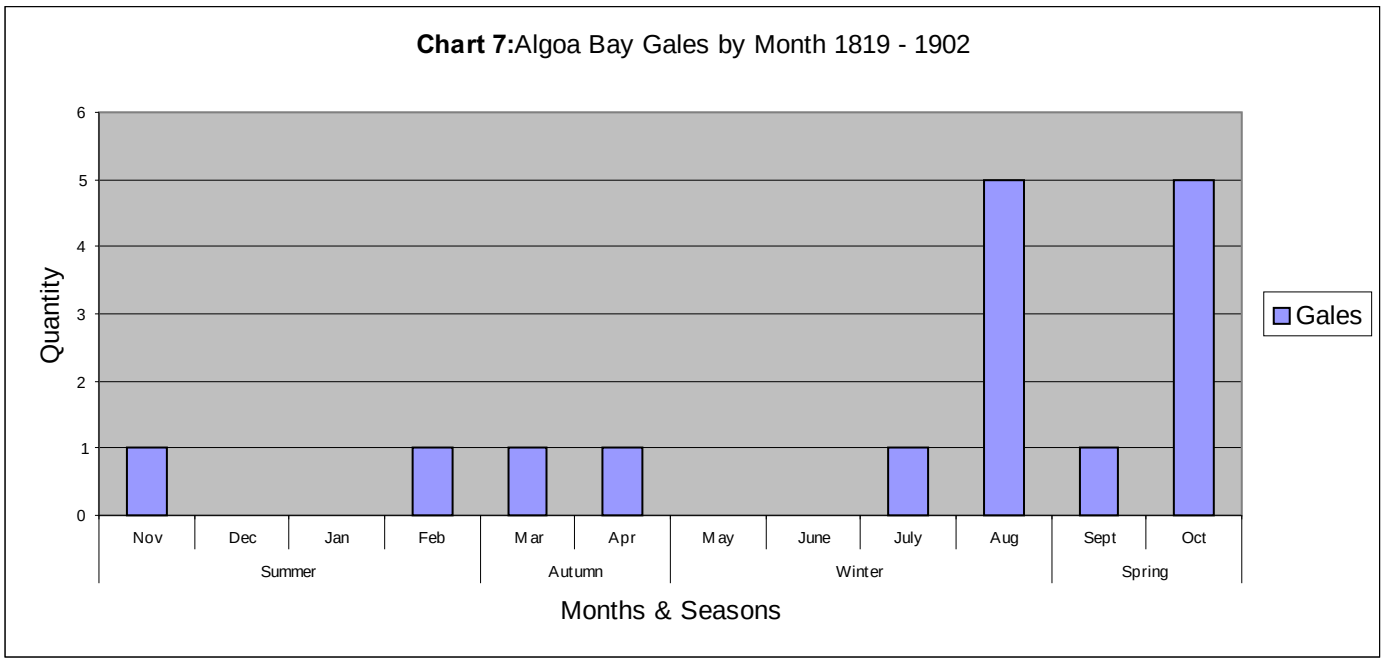
The following table plots 'gales' from 1815-1905, it must be noted that these 'gales' actually refer to incidents where two or more ships were wrecked in Algoa Bay.

Table 3: Dates of 'gales' and casualty lists in Algoa Bay

Date of Gale	**Shipping Casualties**
30 Aug 1819	*Uitenhage Packet*; *Good Hope*
Jan 1834	*Eliza & Jane*; *Royal George*
1 Oct 1835	*Atlantic*; *Cape Breton*; *Urania*
24 Aug 1843	*Delhi*; *Elizabeth Rowell*; *Laura*; *Sea Gull*
21 Aug 1844	*Isabel*; *Trekboer*
25 Mar 1846	*Blackaller*; *Jim Crow*; *Susan*
29 Oct 1846	*Mona*; *Margareth*; *Palestine*; *Resolution*; *Sophia*
5 Apr 1848	*Johanna*; *Martha*
17 Oct 1850	*Doris*; *John Witt*; *Mary Anne*
3 Oct 1859	*Baseileia*; *Chasseur*; *Surat*; *Witch of the Waves*
17 Oct 1859	*Arabian*; *Governess*; *Lyme Regis*; *Prince Wozonzoff*; *Star of the East*; *Wigrams*
18 Sep 1869	*Argali*; *Duke of Buccleugh*; *England*; *Fingoe*; *Flash*; *Forres*; *Gustaf*; *Jeanne*; *Major von Safft*; *Meg Merriles*; *Sarah Black*; *Sea Snake*; *St Croix*
20 Feb 1871	*Abdul Mejid*; *Trent*
27 Nov 1872	*Anne Marie*; *Cruiser*; *E.B. Lohe*; *Taurus*
23 Aug 1877	*Alma*; *Univers*
16 July 1878	*Almira Coombs*; *Petrolella*
30 Aug 1888	*Andreas Rüs*; *C. Boschetto*;*Dorthea*; *Drei Emmas*; *Elizabeth Stevens*; *Jane Harvey*; *Lada*; *Natal*; *Tweed Wolseley*
31 Aug 1902	*Agostino Rombo*; *Arnold*; *Cavalieri Michele Russo*; *Clara*; *Constant*; *Content*; *Coriolanus*; *Countess of Carnarvon*; *Emmanuel*; *Gabrielle*; *Hans Wagner*; *Hermanos*; *Inchcape Rock*; *Iris*; *Limari*; *Nautilus*; *Oakworth*; *Sayre*; *Thekla*; *Waimea*
14 Nov 1903	*Arranmore*; *County of Pembroke*; *Elda*; *San Antonio*; *Two Brothers*; *Wayfarer*; *Lütto*
(Urquhart 2007; Turner 1988)	



As can be seen in the above chart, in 100 years, there were only two decades without mass strandings. The increase in the 1940s could be due to the 1820 settlers becoming established with a concurrent increase in trade. The high numbers in the 1900s was due to the increase in shipping from the South African War. The fact that 1903 was the last of these mass strandings is consistent with the move from sail to steam.



As can be seen from the above chart Black South-Easters were mostly prevalent at the beginning and end of the summer season. The gale in November 1903, when the *County of Pembroke* was wrecked, was unusual. There had only been one other recorded Black South-Easter in November .

Out of 96 vessels that were wrecked between 1819 – 1903, 94 were sailing vessels and two were steam vessels.These two were tugs, obviously their engines were not strong enough to keep them from running aground. During major storms, steam vessels managed to relieve the strain on their cables to prevent them from parting, whereas sailing vessels were often unable to move swiftly out of harm's way.

Figure 9: Gale of1869 (Harradine 2002:58)

Figure 10: Gale of 1902. According to Harradine (2002:86) this is the gale of 1888, but Urquhart (2007:189,191) states that this is the gale of 1902 due to the presence of the *Inchcape Rock*, circled.

Coega River Mouth

According to the Africa Pilot (1967:98-9), the entrance to the Coega River Mouth was small and almost closed by a sandbar.

Gale of 1903 – The Wrecking of the *County of Pembroke*

There are many discrepancies in the reporting on the gale between the three newspapers of the day - The Eastern Province Herald, The Cape Daily Telegraph and the Port Elizabeth Advertiser. Where I think these discrepancies are typographical errors, I have ignored them. Where they appear to be the result of different information sources, I have included the different versions. All the reports and their transcriptions are available in Appendix A.

The *County of Pembroke* arrived in Algoa Bay on 14 October 1903 from London with a cargo of general merchandise. Her Master was Capt. J. Parry. Her agents in Algoa Bay were Keith & Co (The Eastern Province Herald 16-10-1903).

According to Lloyds the vessel was well found and classed A1. The log was not saved (The Cape Daily Telegraph 27-11-1903).

The Cape Daily Telegraph's report on 26-11-1903 on the Court of Inquiry, stated that the *County of Pembroke* had "…officers and hands – 13 in all…". According to Capt. Parry the crew consisted of the Captain, two officers, seven men, two apprentices and two boys, two of the crew deserted while in port. This tally of the crew (13 excluding the Captain, who would not stay at the Seamen's Institute) does not tally with the report in the Eastern Province Herald on 16-11-1903 where it is stated that seventeen crew from the *County of Pembroke* were sent to the Seamen's Institute after the wrecking, this is backed up by the report in The Cape Daily Telegraph on 16-11-1903. According to Bisset (1958:27) the *County of Pembroke's* full crew was 21. The confusion comes from the fact that 17 crew (including the Captain) were on the barque when she arrived, 2 deserted and one drowned, that makes 14, minus the Captain, which leaves 13 crew staying at the Seaman's Institute.

The *County of Pembroke* was berthed, by the Harbour Authorities, in 7½ fathoms of water when she arrived. On 09-11 her berth was moved. The berthing was done by the Harbour Authorities and was up to the Board of Trade requirements. By 13-11, she had discharged 800 tons of cargo and taken in about 400 tons of ballast. There was still about 700 tons of general cargo aboard (The Eastern Province Herald 27-10-1903).

On the morning of Friday, 13 November 1903, a fresh south-east wind was blowing in Algoa Bay, accompanied by light rains. Later in the day, the wind picked up slightly and shifted to the east, by 14:30 it had reached 46 miles/hour. From 15:00- 17:00, a 40-mile wind was recorded by Conrad Carl Hansen, the lighthouse keeper of the Hill Light; it was his job to register the meteorological readings and record the weather. By 18:00, the wind had dropped to almost a dead calm; however a high sea was running and there was heavy rain. The barometer, at this time was falling, it fell from 39.70 to 29.77, and according to witnesses at the Court of Inquiry this indicated a westerly wind might be expected and that this "was not a south-easterly glass". It was further stated that the November gale was unprecedented (The Eastern Province Herald 16-11-1903; 26-11-1903). However, according to Table 3 and Chart 7, this was not strictly true as there was another bad gale on 27 November 1872, when four vessels were wrecked. The month of November 1903, up till the 16th, was one of the wettest months on record (The Cape Daily Telegraph 16-11-1903).

Figure 11: The Hill Lighthouse and the lighthouse keeper's cottage. (Harradine 2002:50)

During the afternoon, the Harbour Master, Capt. Seek, ordered Mr. Sawyer, the man in charge of the Harbour Board Rocket Brigade, to send a section of the Rocket Brigade to the North End Beach at 19:00 and to remain on duty all night. He also ordered two men be kept on duty at the Port Office (The Eastern Province Herald 21-10-1903). The shore did not send bad weather signals to the ships at anchor (The Eastern Province Herald 26-11-1903).

Capt. J. Parry of the *County of Pembroke* had been ashore on 13-11 and he came back onboard at about 16:30 because of the threatening weather. The vessel had two anchors down with 75 fathoms out on the starboard cable and 60 on the port (The Eastern Province Herald 27-10-1903).

At 20:00, the wind rose and shifted again to the south-east; between 22:00 and 23:00 it reached a velocity of 52 miles/hour. All the sailing vessels in the Bay were "tossed about like corks" and the steamers "got up a full head of steam, and thus eased the strain on their cables" (The Eastern Province Herald 16-11-1903).

At 21:00, the Captain of the *County of Pembroke* let out the starboard cable to 90 and the port to 75 fathoms (The Eastern Province Herald 27-10-1903).

At 22:00 the Captain of the *County of Pembroke* increased the starboard cable to 120 fathoms and the port to105 fathoms. At this time he was fixing on springs of manila coil hawsers when the starboard cable parted. The sheet anchor with 20 fathoms of 3¼ inch steel wire cable, attached to the mast, was paid out. The port cable was subsequently paid out to its full length – 135 fathoms (The Eastern Province Herald 27-10-1903).

At 22:30 the *County of Pembroke* sent up a blue flare and a rocket of distress, as the vessel was dragging (The Eastern Province Herald 16-11-1903; 27-11-1903). This action was in accordance with Article 31 of the British Regulations for Preventing Collision at Sea, 1897, which stipulates that a vessel in distress that requires assistance from either another vessel or from the shore should, among other possibilities, fire rockets or shells that throw stars of any colour or description, one at a time, at regular intervals (Swainston N.D.:35). The blue flares were seen by the Master of the *Arranmore* on his starboard quarter (The Eastern Province Herald 26-11-1903). He also states that he saw two anchor lights, one forward and one aft, burning (The Cape Daily Telegraph 25-11-1903), which was correct in terms of British regulations of this time which state that a sailing vessel, over 150ft, should show two white lights, one forward and one aft and these would apparently be visible up to a mile away (Swainston N.D.:40a). However, this would depend on visibility due to prevailing weather conditions.

At this time the Port Office fired off two rockets, the purpose of which was to warn the life boat crew and the two Rocket Brigades to prepare themselves (The Eastern Province Herald 16-11-1903). Capt. Wares reports that when he got to the Rocket Brigade shed at 10:50, 14 of the men were already there and the rest arrived shortly thereafter. They then positioned the cart opposite Broad Street (The Eastern Province Herald 21-11-1903).

Figure 12: P.A.G. Rocket Brigade on the beach with their rocket apparatus (Urquhart 2007:69)

Figure 13: P.A.G. Rocket Brigade in action during the gale of 1903, I do not know which ship the artist was depicting (Orpen 1967:49)

At 23:30, there was a lull in the storm, but the sea was still running high and crashing over the jetties (The Eastern Province Herald 16-11-1903). The Master of the *Arranmore* noticed a steamer on his starboard quarter trying to steam out to sea, this was the *S.S. Mashona* (The Eastern Province Herald 26-11-1903).

At about midnight the wind dropped to 30 miles/hour and vacillated between south-south-east and south till dawn (The Eastern Province Herald 26-11-1903). At 23:50, one of the sailing vessels set off another blue flare of distress. The Port Office once again discharged two warning rockets (The Eastern Province Herald 16-11-1903).

As the *County of Pembroke* was dragging, she fouled the *Lütto.* According to the Captain of the *Lütto*; this was at about 00:00. The *County of Pembroke's* port quarter struck the *Lütto* first, somewhere about the bow or amidships. They were entangled for some time and the *County of Pembroke* dismasted the *Lütto* and swept away her jib-boom, luckily no-one was injured (The Eastern Province Herald 16-11-1903, 27-10-1903).

The *County of Pembroke* apparently lost her jib boom (Port Elizabeth Advertiser 18-11-1903). In the photographs of the wrecking of the *County of Pembroke* obtained from Museum Africa, the barque's entire bowsprit was snapped, but only fell off after the gale (See Figures 31-32). There was no way to avoid the *Lütto*, as the *County of Pembroke* was dragging too fast (The Eastern Province Herald 27-10-1903). After the storm, when the *Lütto* raised her anchor, another anchor and cable was twisted around hers, the *Lütto's* Captain did not know if this came from the *County of Pembroke* (The Eastern Province Herald 28-11-1903).

At 00:30 on 14-11, the *S.S. Mashona* seemed to become unmanageable and then cut across the bows of the sailing ship *Arranmore*. The *S.S. Mashona* carried away the *Arranmore's* head gear and cut water; pulled all the chains out of the chain locker and parted them; carried away the third anchor, the spare anchor, the figurehead and damaged the bow plates (The Eastern Province Herald 26-11-1903). The *Mashona* managed to steam to safety and eventually anchor off the Swartkops River at 05:30; she sustained damage to her bridge, smoke stack and bulwarks (The Eastern Province Herald 17-11-1903; 26-11-1903).

The night was very dark and no-one on shore could see what was happening in the Bay (The Eastern Province Herald 16-11-1903).

Just before 01:00 the last cables on the *County of Pembroke* parted. Witnesses at the Court of Inquiry could not verify if the port cable was slipped or parted. Capt. William Gowan, the Lloyds' Surveyor at Port Elizabeth stated that he had been aboard the wreck when he drew up his official survey. He stated that he did not particularly notice the cables, but remembered that there was a piece of the starboard cable on board that had been used and stated he did not remember the port cable. The cable (presumably the starboard) was running through the hawse pipes and attached to the windlass. He also stated that he saw a steel hawser attached to the mast and that he saw the chains running into the chain locker, however, this was now full of water (The Eastern Province Herald 27-10-1903). Griffith Jones, the chief mate of the *County of Pembroke* stated that the port cable definitely parted as he had gone down to the chain locker to fasten the end on deck, so that they could let out a bit more cable. However, it parted before he could do this; the hawser was also carried off at this time. Ernest Bertram Beck, Harbour Master of Port Elizabeth, stated that he visited the wreck of the *County of Pembroke* on 24-11; he saw that she was full of water and likely to become a total wreck. He saw both chains through the hawse pipe, over the windlass and leading down into the chain locker. He also saw a wire hawser end round the foremast and one manila rope, probably used as a spring, lying on the port side of the ship. He stated that nothing had been slipped, everything had parted (The Eastern Province Herald 28-

10-1903).

The County of Pembroke swung round to port and headed for the beach where she ran ashore at 01:00. After clearing the *Lütto*, Capt. Parry ordered everyone to don regulation life-belts (The Eastern Province Herald 27-10-1903). Both vessels had their anchor lights on at all times. By the light of another blue flare, a ship was seen by the rescuers to be straining very hard (The Eastern Province Herald 16-11-1903). Whether this meant straining on her cables or generally straining against the sea is hard to decipher.

In addition to the darkness from the storm, a thick mist rose from the north (The Eastern Province Herald 16-11-1903). Shortly thereafter, another blue flare was seen; in the light of this, the onlookers could see a sailing vessel rapidly drifting towards the shore. As it transpired, three vessels were actually drifting ashore, even though only one could be seen by the onlookers (The Eastern Province Herald 16-11-1903). It seems probable that these were the *Arranmore*, *County of Pembroke* and *San Antonio* (it is reported in the Cape Daily Telegraph on 16-11-1903, that the *San Antonio* came ashore after 10:00).The *San Antonio* ran aground north of Dynamite Jetty and the crew came ashore by themselves (Orpen 1967:130).

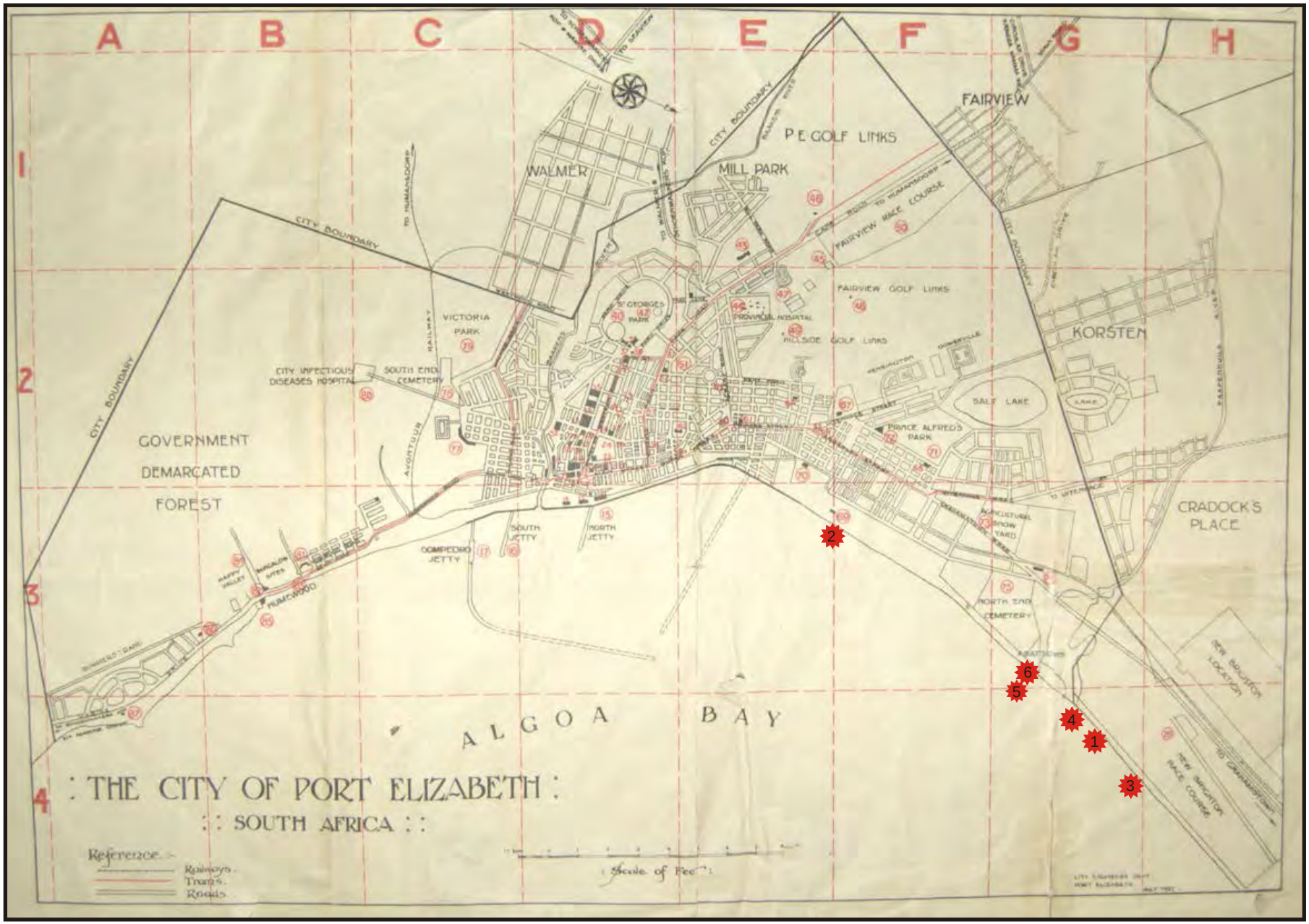
Just after 01:00 the Rocket Brigade heard a crashing sound which they said sounded like falling spars. This was the first indication that the *County of Pembroke* had come ashore (The Eastern Province Herald 21-11-1903).

The *County of Pembroke* came ashore opposite Broad Street (See Map 2). She was apparently showing no lights and, because of the darkness, it was some time before she was spotted (The Eastern Province Herald 16-11-1903). She was found near the Harbour Board Rocket Shed (Port Elizabeth Advertiser 18-11-1903). According to Orpen (1967:129), she came ashore near the *Emmanuel*, which was wrecked in the gale of 1902. A John McAllister objected to the report that the *County of Pembroke* was not showing any lights. He wrote a letter to the Eastern Province Herald stating, “Now, this statement is not giving justice to those concerned, as I for one observed blue lights burning on the said vessel often as she drifted to the breakers, and before the vessel was aground distinctly observed her topsails filled and that her spars were white.” (The Eastern Province Herald 17-11-1903). In the Court of Inquiry on 26-11-1903, it is stated by witnesses that all the yards on the *County of Pembroke* were braced up (The Eastern Province Herald 27-11-1903). Although The Cape Daily Telegraph reports on 26-11-1903 that while the *County of Pembroke* was entangled with the *Lütto*, some of the sails got adrift. According to James Bisset (1958:109-10) the spars were painted white.

The light rain that had been falling all night gave way to heavy, blinding rain. All the sluits in town were flooding. The wash off from the town increased in velocity, most of it pouring onto the beach making footing very tenuous and treacherous. The beach was thus assaulted from the land side by dozens of streams and from the sea by huge rollers (The Eastern Province Herald 16-11-1903).

At about 02:00, two vessels were seen drifting shorewards. One managed to put up a bit of sail and was attempted to beach on the soft ground near Dynamite Jetty (The Eastern Province Herald 16-11-1903). Presumably these are the *Wayfarer* and *Two Brothers*; the *Two Brothers* seemed to sail away from the shore briefly as by daybreak she was still afloat. The *Wayfarer* ran ashore at about 02:00. The photographs from the gale show these two ships wrecked alongside the *Sayre* (Figures 14, 25).

These vessels were in the vicinity of the Harbour Board Rocket Brigade, under Mr. Sawyer assistant to Capt. Clift. The Brigade headed towards the vessel to render assistance. After an enormous struggle along the waterlogged beach these men



Key:
1 - *Arranmore*
2 - *County of Pembroke*
3 - *Elda*
4 - *San Antonio*
5 - *Two Brothers*
6 - *Wayfarer*

Map 2: City of Port Elizabeth 1927, showing the wrecks from the 1903 gale. I have approximated the sites of the wrecks from the historical records and photographs. While the area it is shown in is accurate, the only one which I am unable to position correctly in relation to the others is the *Elda*.(Picture NMMM Library)

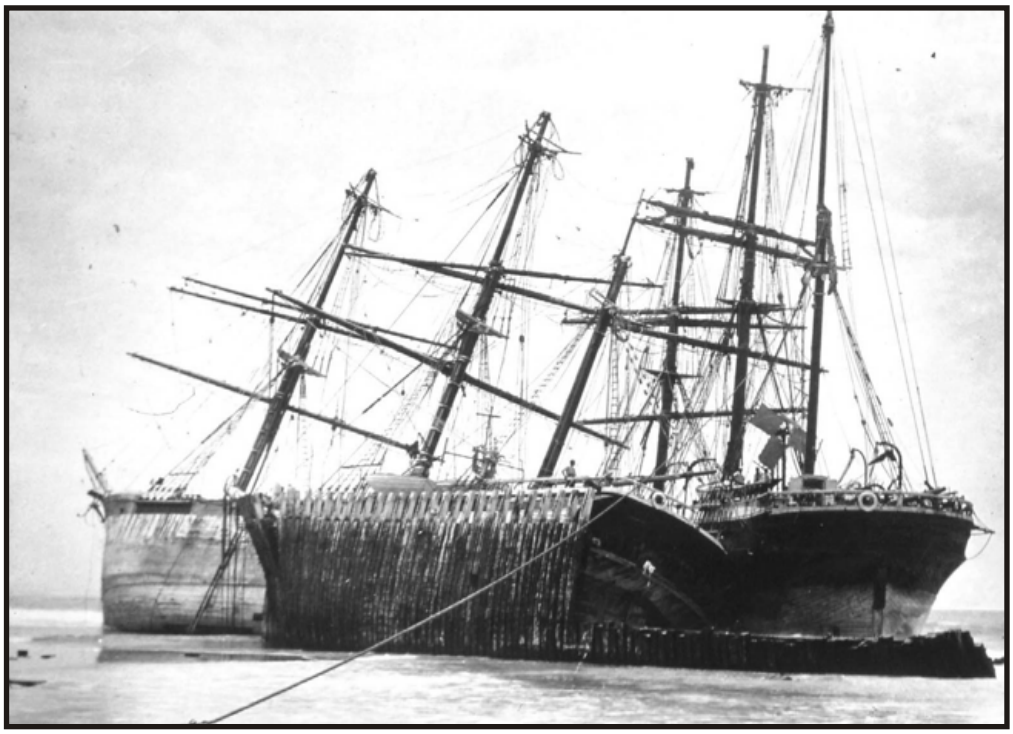


Figure 14: *Two Brothers* and *Wayfarer* lying broadside against the old wreck, the *Sayre* (Photo: Colin Urquhart)

attempted to rescue the crew of the *Wayfarer* (The Eastern Province Herald 16-11-1903). This vessel was driven broadside on near the Slaughter House and the old wreck, *Sayre* (Port Elizabeth Advertiser 18-11-1903). The conditions on the beach around this wreck were extremely difficult and eight rockets were shot to the vessel. By 04:00, a line was attached and a breeches buoy rigged, the crew were transferred to the *Sayre* and then to the beach (The Cape Daily Telegraph 16-11-1903). By 16-11-1903 the *Wayfarer* was breaking up completely (The Eastern Province Herald 17-11-1903).

At 04:00 the *Arranmore* hit the beach, the foremast went by the board and the main topmast broke by the cap (The Eastern Province Herald 17-11-1903; 26-11-1903). But according to the Court of Inquiry into the loss of the vessel, she ran ashore at 00:00 (The Eastern Province Herald 28-10-1903).

The P.A.G. Rocket Brigade, led by Capt. Wares, went to work, attempting to rescue the crew of the *County of Pembroke*. However, she was lying where the five vessels went ashore in the gale of 1902 and this hampered the efforts of the Rocket Brigade as the line kept getting caught in old wreckage. They fired three lines at the *County of Pembroke* without success, the fourth shot was perfect. However, there was no sign from the vessel. Eventually the crew of the *County of Pembroke* came ashore in their own boat just after daylight. The newspapers claim that the Captain misunderstood the printed instructions relating to the Rocket Brigade that he received when he entered Algoa Bay in October (The Eastern Province Herald 16-11-1903). However, Capt. J. Parry would have been entirely familiar with the working of the rocket apparatus as Reed's Seamanship was a standard volume used by all British seamen. This textbook for Mates and Masters has an entire section in it, “Instructions for using the Mortar and Rocket Apparatus for Saving Life” (Swainston N.D. 41-43). I submit that, the Captain knew the barque would not break apart in the waves. The *County of Pembroke* came ashore amid the wreckage from the Great Gale of 1902, he decided to avoid the danger of slinging his crew across and through the old wreckage, instead waiting for first light then coming ashore on the ship's boat.

The crew said she was full of water after running foul of old wreckage (The Eastern Province Herald 17-11-1903). In 1904 when the wreck was salvaged, she was resting on a limestone rock and that ripped the hole in her keel (The Eastern Province Herald 24-03-1904).

The Rocket arranged for Firing.

The Rocket Line carried over a Wreck.

Landing the Crew in the "Breeches Buoy."

Figure 15: Instructions relating to the Rocket Apparatus for Saving Life from Shipwreck, issued by the Board of Trade, London in 1893.

The best description of what Algoa Bay looked like on the morning of 14-11-1903 is from The Cape Daily Telegraph:

> "The whole of this morning crowds congregated on the jetties to witness the tragedy being enacted in the bay. The sight from the north jetty was grand in its awfulness. An exceptionally strong sea was running, and huge white crested waves swept over the jetty and beat up against the sea wall with enormous force. The waves were so great as at one moment to lift the lighters high above the level of the jetty and the next moment to hide them in a deep trough. All along the shore the sea was churned into thick white froth. It was a grand spectacle, but it told of the cruel strength of the ocean also."

Figure 16: View from Port Elizabeth of South Jetty and Dom Pedro Jetty, circa. 1904 (Harradine 2002:68)

Figure 17: Postcard showing the sea wall (Harradine 2002: 251)

By daybreak four vessels had run ashore, the *Arranmore*, *County of Pembroke*, *San Antonio* and *Wayfarer*. The *Two Brothers* was dangerously close to shore (The Cape Daily Telegraph 14-11-1903). Soon after 06:00 she ran ashore (The Eastern Province Herald 16-11-1903). Five other barques also drifted close to the beach, the *Victor*, *Advokat*, *Schiander*, *Hercules* and *Johani.* The *Letezia* and the *S.S. Mashona* had also drifted close in (The Eastern Province Herald 16-11-1903).

According to a report in The Cape Daily Telegraph (16-11-1903) the *Two Brothers* ran ashore at 07:00. The Rocket Brigade managed to get their first rocket onto the vessel and rescued the crew with the breeches buoy; the first man on land brought the ship's cat (The Cape Daily Telegraph 14-11-1903; 16-11-1903). The *Two Brothers* came to rest broadside, close to the *Wayfarer* (Port Elizabeth Advertiser 18-11-1903). The *Two Brothers'* rudder was carried away after she ran aground, but she was otherwise safe (The Eastern Province Herald 17-11-1903).

Crane tenders on the North Jetty and boatmen attempted to help the *Arranmore*. They were led by Mr. Harding and Mr. Stead. A log of wood with an attached line was thrown overboard. When it washed ashore, it was hauled up. A barrel was rigged up and the Captain's wife, Mrs. Howes, was brought ashore. Thereafter a boatswain's chair was attached and the next crew member brought Mrs. Howes' baby with him. The *Arranmore* was in ballast, bound for Newcastle, Australia (The Eastern Province Herald 16-11-1903; 21-11-1903). By 16 November, all the *Arranmore's* masts except the mizzen mast had gone by the board; her bowsprit had also washed away (The Eastern Province Herald 17-11-1903).

Figure 18: Unknown shipwreck 1903. The Rocket Brigade can be seen in the foreground and a three-masted ship in the background. I believe this is a photograph of the *Arranmore*, for the reasons stated below (Photo: Colin Urquhart)

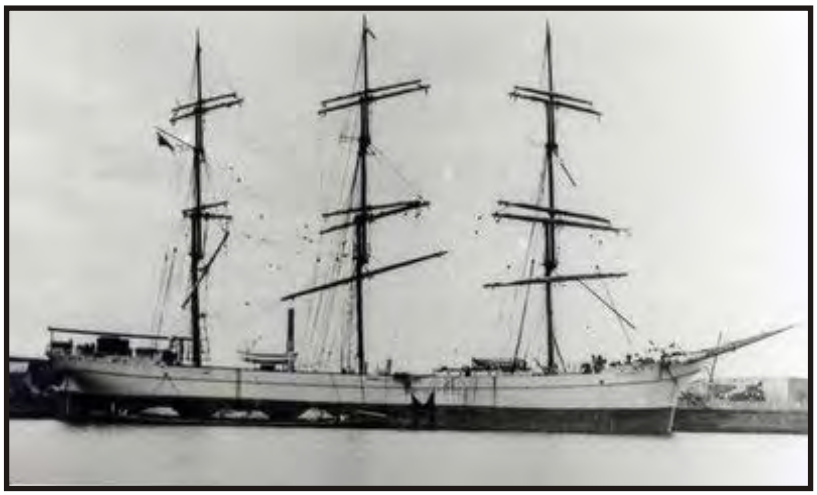


Figure 19: The *Arranmore* (State Library of South Australia). The hull is the same as the hull in the unknown photograph above. The newspaper reported that all the masts had gone by the board, except the mizzen mast; the bowsprit was washed away. The figurehead was removed by the *S.S. Mashona* (The Eastern Province Herald 17-11-1903). The figurehead cannot be seen in Figure 18. The information on the state of the masts tallies with the photo.The *Arranmore* was refloated and continued to sail until 1909. From 1926-1967, she served as the Training Ship *Vindicatrix* in Great Britain (www.allatsea.cx).

Figure 20: The alleged *Elda* in 1903 (Turner 1988:192). However, I believe this is actually a picture of the *Arranmore* (Figures 18 and 19). The newspaper reports of the time state that the *Elda* broke her back shortly after running aground and, within a couple of days, broke up completely (The Eastern Province Herald 16-11-1903, 17-03-1903). The definitive reason that this picture cannot be the *Elda*, is that the *Elda* was a barque and the *Arranmore* was a ship, the only ship wrecked in the gale of 1903.This description does not match this photograph and it looks like the same vessel as in Figure 18.

At 09:00 the Norwegian barque, *Elda*, parted her cables and drifted towards the beach. The tug, *Sir Frederick*, tried to get a warp aboard but failed. During the rescue attempt, a huge sea washed away her bulwarks; her engine room was flooded, putting out her fires. She dropped anchor and relit her fires. However, the barque, *Elda*, ran ashore north of Dynamite Jetty, opposite New Brighton (The Eastern Province Herald 16-11-1903). She beached broadside on near the *Arranmore* (Port Elizabeth Advertiser 18-11-1903).

The Harbour Board Rocket Brigade put a shot over her main and mizzen mast, but the crew were unable to retrieve it; the third line was retrieved, made fast to the mizzen mast and the breeches buoy brought the crew to safety. Halfway through bringing the crew ashore, the main mast broke; the waves washed away the bulwarks amidships and soon after the barque's back was broken. Fortunately, the vessel held together long enough for all the crew to be brought ashore (The Eastern Province Herald 16-11-1903). A pig was washed overboard, two members of the Brigade rescued the animal and “shrilly squeaking, it was ignominiously lugged home by its ears” (Port Elizabeth Advertiser 18-11-1903). The *Elda* broke up completely a few days later (The Eastern Province Herald 17-11-1903).

The tug *H.B. Christian* supplied a warp to the sailing vessel *Fennia* on Saturday morning, after both her cables parted. This action saved her from being driven ashore (The Eastern Province Herald 21-11-1903). Nearly every sailing vessel in the Bay sustained damage of some sort, mostly to windlasses and hawse pipes, many lost anchors and chains; by 17 November, 13 vessels were riding on warps (The Eastern Province Herald 17-11-1903; 21-11-1903).

A tug, the *Itala*, was saved by the quick thinking of its only crew, two seamen and a stoker. They got the tug started and put out to sea (The Eastern Province Herald 16-11-1903).Three lighters were also wrecked (The Eastern Province Herald 16-11-1903; The Cape Daily Telegraph 16-11-1903). The old water boat broke from her moorings and was driven ashore (The Eastern Province Herald 21-11-1903).

The ships went ashore on soft ground and did not break apart quickly, which made rescue work easier. However, wrecks from previous gales seriously impeded the work of the rescuers. The Harbour Board had only agreed to remove wrecks that were a danger to navigation. These wrecks were only a danger to life once a ship has gone aground (The Eastern Province Herald 16-11-1903).

Figure 21: The Seamen’s Institute. (Harradine 2002: 104)

The crews of the wrecked vessels were sent to the Seamen's Institute, they were as follows:

*Arranmore (*11); *County of Pembroke (*17); *Elda* (10); *San Antonio* (7); *Two Brothers* (14) and *Wayfarer* (8)

(The Eastern Province Herald 16-11-1903; The Cape Daily Telegraph 16-11-1903)

There was and is still some confusion as to whether a life was lost or not during the gale of 1903. The Cape Daily Telegraph reports on 14-11-1903 that there was one loss of life, either a cabin boy from the *San Antonio* or from the *County of Pembroke*. However, on 16-11-1903 they report the boy presumed drowned, Louis Aareeci, an eighteen year old Italian from the *San Antonio*, was recovering well. They further state that everyone got off safely from the *County of Pembroke*. The Eastern Province Herald reported on 16-11-1903 that although it was thought a young Italian cabin boy on the *San Antonio* had drowned when he slipped into the water while being rescued, he had in fact been picked up further along the beach and was resuscitated and taken to the Provincial Hospital suffering from exhaustion. They report that he recovered completely. The Eastern Province Herald reports on 18-11-1903 that William Hughes of Newborough, Angelsea, North Wales, an 18 year old able seaman aboard the *County of Pembroke,* was washed overboard just as the vessel grounded. They report that the victim was wearing a life-belt. The Cape Daily Telegraph on 16-11-1903 reports that the seaman William Hughes, from the *County of Pembroke*, was washed up alive a long way down the coast, where he was picked up by a farmer, Mr. Frost. However, they do admit that this report was not confirmed.

In the Court of Inquiry into the wreck on 26-11-1903, the Captain of the *County of Pembroke* states that soon after running aground, a huge wave broke over the ship and washed an ordinary seaman, William Hughes of Holyhead, North Wales overboard. He was wearing a life-belt, but still drowned (The Eastern Province Herald 27-11-1903). The Court of Inquiry into the loss of the *County of Pembroke* regretted the drowning of Apprentice Hughes, but stated the best means available were used to avoid loss of life and therefore attached no blame to the Master (The Eastern Province Herald 28-11-1903). There are no other reports in the newspapers on the fate of William Hughes and as the Court of Inquiry was held about 12 days after the wreck and they officially confirm the death of William Hughes, I am assuming that he did indeed perish.

A shipwreck fund was spontaneously started by the Commander of the *R.M.S. Briton*. While no formal public appeal was made by the mayor, voluntary donations were collected (The Eastern Province Herald 17-11-1903) and distributed equally amongst the Masters of the six vessels that went ashore and the Master of the dismasted *Lütto* (The Eastern Province Herald 05-12-1903).

The North Jetty was damaged during the storm; the engine room at the end was washed away. The Dom Pedro Jetty also sustained damage (The Eastern Province Herald 16-11-1903). The Baakens River flooded and the tide went above the electric tram power house (The Eastern Province Herald 16-11-1903).

News of the wrecking of the vessels was reported in the New York Times on 15-11-1903.

Figure 22: Port Elizabeth breakwater, circa. 1867. Sailing vessels are anchored in the background (Harradine 2002:44)

Table 3: Gale of 1903 – wrecked and dismasted vessels

Name	Nation	Type	Tons	Captain	Date Built	Builders	Owners	Dimensions	Cargo
Wrecked									
Arranmore	Britain	St.sh	1 782	T.W. Howes	1893	Russell & Co, Port Glasgow	Thomson, Dickie & Co	L – 263' W – 39' D – 23.5'	Ballast
County of Pembroke	Britain	I.bk	1 065	J. Parry	1881	Doxford & Sons, Sunderland	W. Thomas & Co.	L – 221.5' W – 35' D – 30'	Gen.
Elda	Norway	I.bk	648	G. Gouldransen	1878	H.F. Ulricks, Vegesack	Chas Moller	L – 172' W – 29' D – 16'	Maize Flour
San Antonio	Italy	I.bk	502	Astartio	1869	Illiff, Mounsey & Co, Sunderland	G. Lubrano di Scampamorte	L – 167' W – 26' D – 17'	Bricks Tiles
Two Brothers	Norway	W.bk	951	J.L. Johannesen	1870	S.J. King, New Brunswick	A.B. Amundsen	L – 176' W – 35' D – 22'	Deals
Wayfarer	Norway	W.bk	610	H. Petersen	1874	Digby, Nova Scotia	R. Kundson	L – 140' W – 33' D – 18'	Deals
Dismasted									
Lütto	Russia	W.bk	431	J. Sillston	1891	J. Jakobsson, Loko	J.F. Ahlgren	L – 136' W – 31' D – 15'	Deals
(The Eastern Province Herald 1903-11-16; Turner 1988:200)									

The Court of Inquiry into the loss of the *Arranmore* was held in the Court House at 10:30 on Wednesday 25-11-1903 and into the loss of the *County of Pembroke* at 10:30 on Thursday 26-11-1903. The Court comprised of Mr. J. Truro Wylde CC and RM as President; Capt. John Pratt, Master of the barque *E.A. O'Brian* and Capt. Robert Milne, Master of the barque *Woodburn* as members (The Eastern Province Herald 25-11-1903; 26-11-1903; 27-11-1903).

The Court of Inquiry into the loss of the *County of Pembroke* was suspended for the day on 26-11-1903 as the members wished to call in the marine surveyor to check whether the port cable was slipped or if it parted, as it was still onboard (The Eastern Province Herald 27-11-1903).

The findings of the Court of Inquiry into the loss of the *Arranmore* was that her cables parted due to the collision with the steamer *S.S. Mashona* and she was driven ashore by the foul weather. No blame was attached to Capt. Howes, the officers or any of the crew in the loss of their ship, *Arranmore* (The Eastern Province Herald 28-11-1903).

The findings of the Court of Inquiry into the loss of the *County of Pembroke* was that although well found and all equipment was up to specifications, her cables had parted and she was driven ashore by the high wind and seas. No blame was attached to Capt. Parry, her officers or crew in the loss of their barque (The Eastern Province Herald 28-11-1903).

The rescuers learned a number of lessons from this storm. Firstly, the life boats were useless in big seas; it was recommended that only one life boat crew be retained in the future. Secondly, the P.A.G. Rocket Brigade Shed was too far to the south, requiring a long, exhausting pull by the Brigade crews to get the carts into the positions where the vessels always seem to go ashore; it was suggested that it be moved to the north of Broad Street Shed. Thirdly, the sheds should be connected to the

telephone exchange. Fourthly, each brigade should be supplied with a wagon to carry spare stores; they would follow each brigade and save time. At that time, the cart had to be dragged back to the shed to be refitted. Lastly, refreshments should be provided to sustain the men's strength and morale (The Eastern Province Herald 21-11-1903).

The first adverts for the salvage of the *County of Pembroke* appear in the Eastern Province Herald on 19-11-1903 and 20-11-1903. Tenders were invited for the salvaging of the cargo on a percentage basis; it was to be landed, sorted and stacked above the high water mark. Tenders were to be handed to Capt. J. Parry by 20-11-1903 before noon. The agents for the salvage were the same agents responsible for the cargo when she arrived in October.

The next adverts in The Eastern Province Herald on 01-12-1903 and 02-12-1903 called for tenders for the salving of the ship and cargo on a percentage basis – no cure, no pay. The cargo was to be landed and stacked above the high water mark and the vessel safely anchored in Algoa Bay. Tenders were due by noon on 02-12-1903. This time the agents were Mackie, Dunn & Co., London Salvage Association.

On 19-01-1904 and 20-01-1904, there are adverts in The Eastern Province Herald for the sale of salvaged cargo. The sale was held at The Harbour Board Depositing Ground, South End on 20-01-1904. The auction was handled by Armstrong & Co. Damaged cargo for sale included the following: lime juice cordial, whiskey, gin, candles, sulphur, bales of brown paper, galvanized wire netting, sashweights, planks, glass and coke (coal).

On 05-02-1904 a further auction of damaged cargo was advertised in The Eastern Province Herald in the same location and by the same auctioneers. The damaged cargo offered for sale this time, included: oils in drums and cases, antifriction grease in kegs, coke, planks, sulphur, candles, cases of glass, ship's sails, barrels of meat and boats.

Apparently there were numerous attempts to refloat the *County of Pembroke*, however, the salvors eventually gave up and the Harbour Commissioners asked the Marine Superintendent to help remove it (The Cape Daily Telegraph 23-03-1904).
The Eastern Province Herald reports on 22-03-1904 that an attempt was made the previous day, by tugs, to move the dismasted barque, *County of Pembroke* to a spot where she would no longer be in the way of shipping. However, while she was shifted slightly, she would not budge. It was further reported in the same newspaper on 24-03-1904 that the Harbour Board managed to remove the wreck after all. She was lying a hundred yards from the shore of North End Beach, resting on a limestone rock. As she was filled with water, at least 40 Harbour Board labourers, under the instruction of Capt. Clift, dismantled her (The Cape Daily Telegraph 23-03-1904) and used three steam salvage pumps of 5, 6 and 7 inches to pump out as much water as possible. One hundred tons of cement was moved from one end of the vessel to the other. A diver was used to stop up the17-foot tear found in the keel. At 19:00 on 22-03-1904, the pumps still running, two Harbour Board tugs got the wreck off. She was towed 9 miles in the direction of the Coega River Mouth (The Eastern Province Herald 24-03-1904). According to The Cape Daily Telegraph on 23-03-1904, the wreck was “towed to a spot off Coega Island, where she has been sunk.” But on 24-03-1904, the same paper reports that she was beached.

Figure 23: Rocket apparatus on the beach, 1903 gale. The Rocket apparatus is in the middle distance while the foreground is dominated by what appears to be an explosion. In the background are the remains of an old wreck (Photo: Colin Urquhart)

Figure 24: View from the beach, 1903 gale. I think this picture is not of the wrecks, but rather of the five other barques that drifted close to the beach, the *Victor*, *Hercules*, *Advokat Schiander*, *Jolani* and *Letezia*. (The Eastern Province Herald 16-11-1903; Photo: Colin Urquhart)

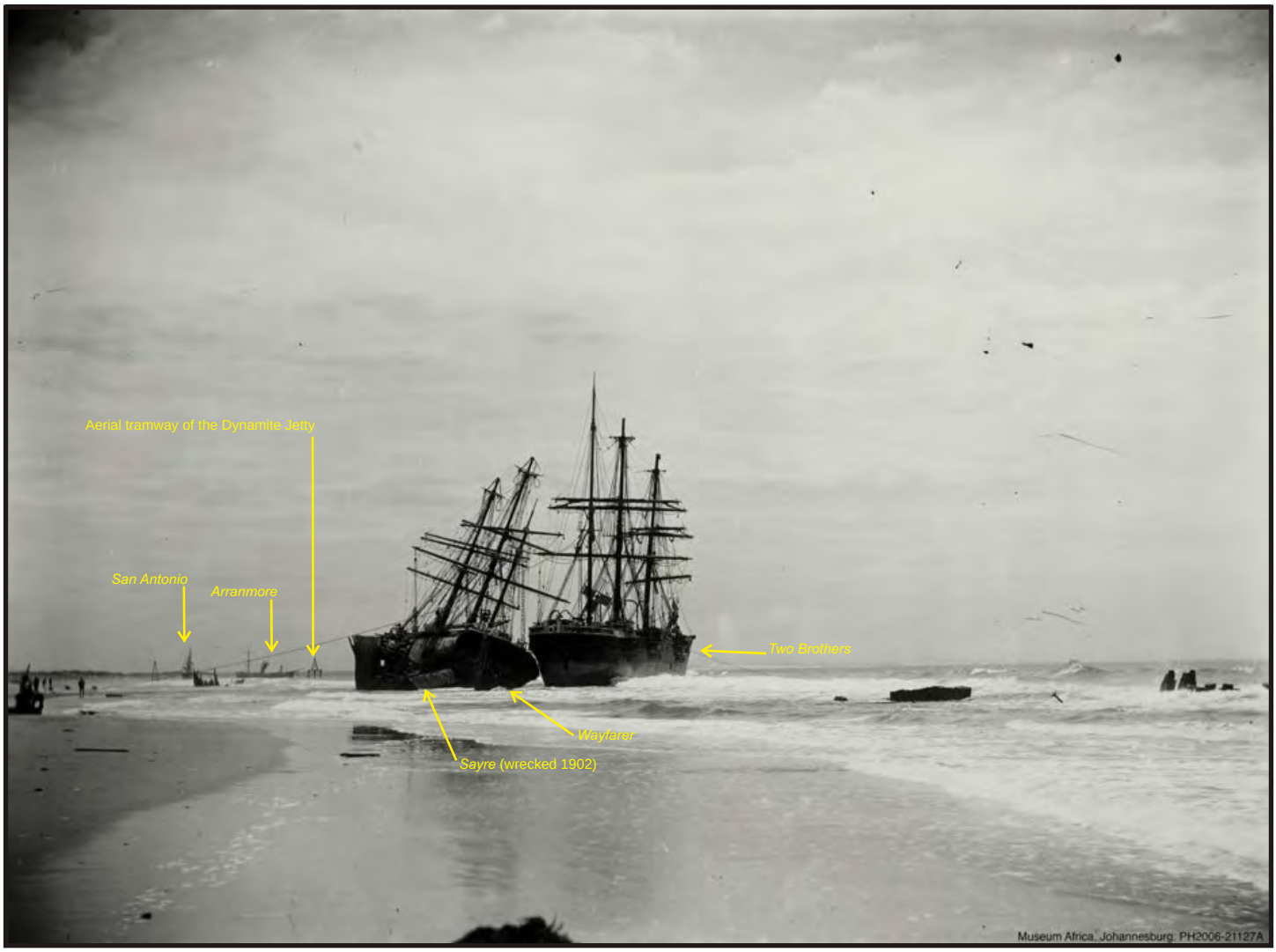


Figure 25: This photograph from Museum Africa (PH2006-21127A) shows the *Two Brothers* and *Wayfarer* in the foreground. In the background the *Arranmore* can be seen near the aerial tramway of Dynamite Jetty. This jetty was in operation from 1899 to just after World War I (Harradine 2002:53). Between the A*rranmore* and the *Two Brothers* and *Wayfarer* is another sailing barque which I believe is the *San Antonio* for the reasons explained under Figure 26.

Figure 26: In this photograph from Museum Africa (PH2006-24803A), the wreck of the *Arranmore* is in the background. The vessel in the foreground is an iron barque. The flag on the mizzen mast appears to have three vertical stripes with a cross in a circle in the middle stripe. Italy traditionally uses a tri-colour flag. The only vessels from this gale that have not been identified in photographs are the *Elda* and *San Antonio*. Eye-witness accounts of the gale state the *Elda* broke her back, lost her bulwarks and her top main and mizzen masts. This vessel is clearly not as damaged as the *Elda* was reported to be. The *San Antonio* ran aground near the *Arranmore* and her crew landed unassisted. This tallies better with the above photograph, ergo I believe this vessel is the *San Antonio*.

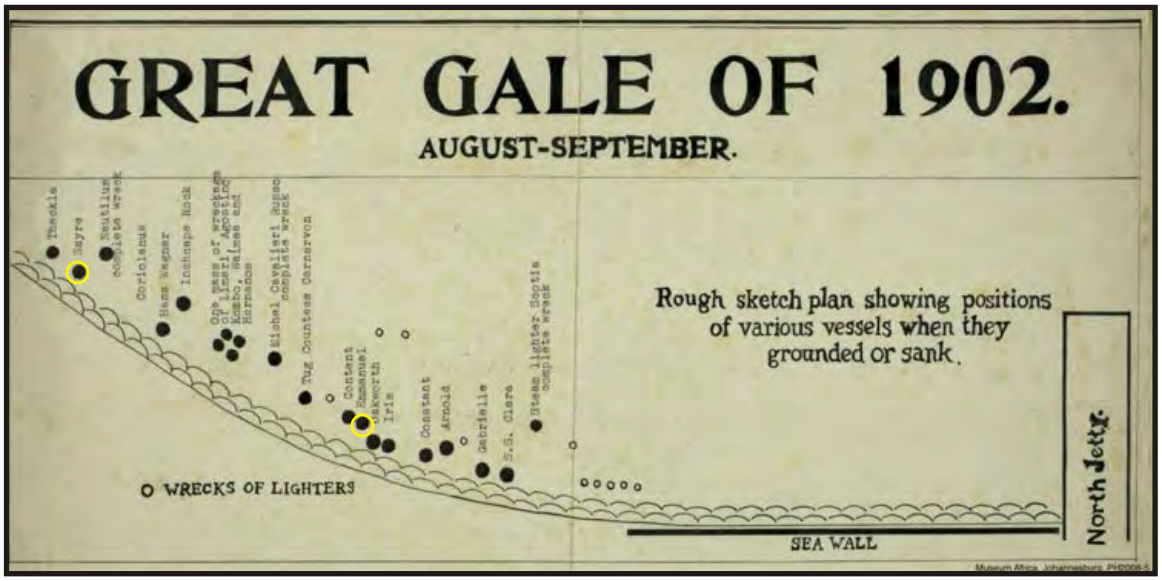
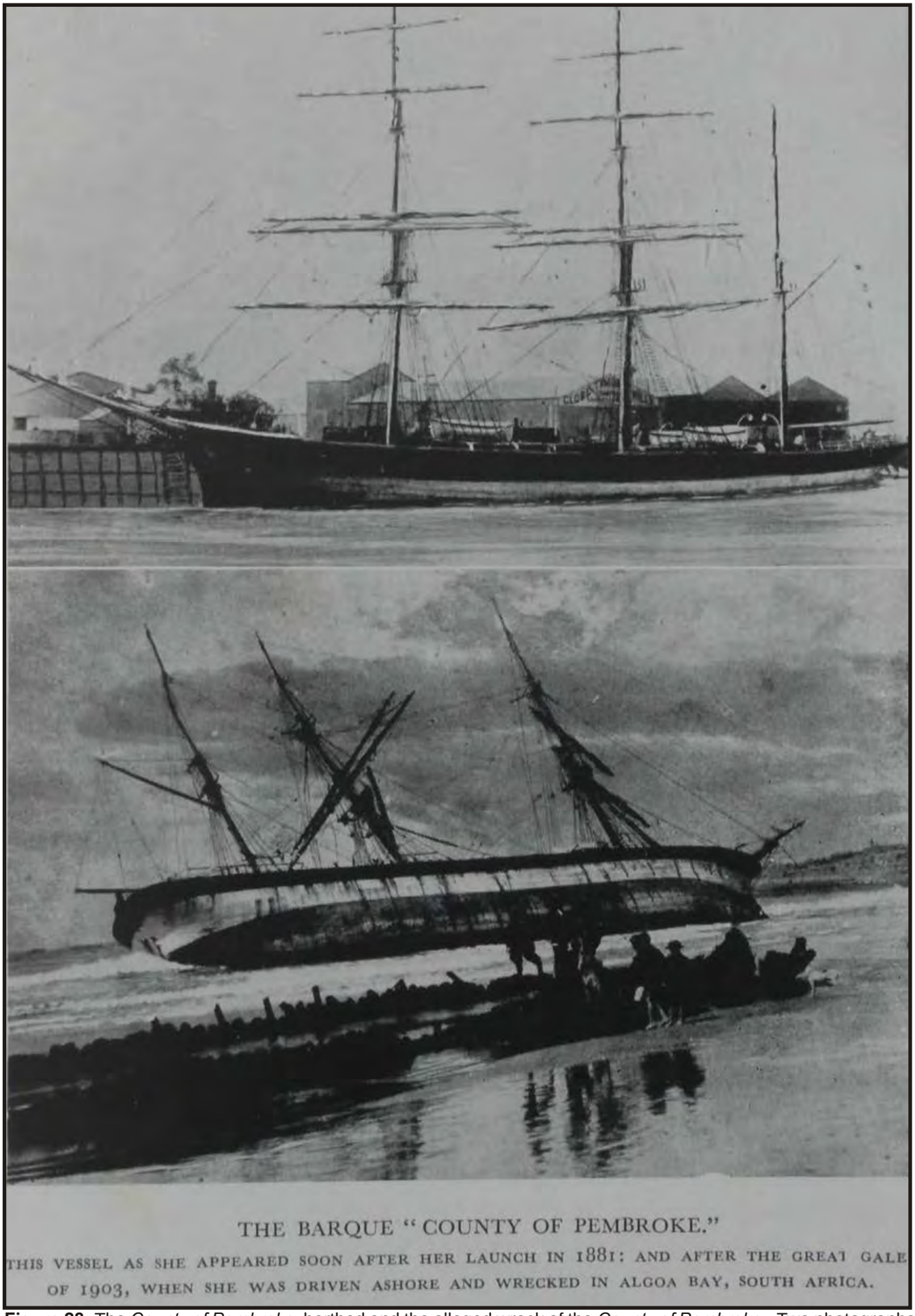


Figure 27: This map of the gale of 1902 from Museum Africa (PH2008-5) shows the relevant positions of the wrecks. The ones are of interest to the Gale of 1902 are circled in yellow, the *Emmanuel* and *Sayre*.



THE BARQUE "COUNTY OF PEMBROKE."

THIS VESSEL AS SHE APPEARED SOON AFTER HER LAUNCH IN 1881: AND AFTER THE GREAT GALE OF 1903, WHEN SHE WAS DRIVEN ASHORE AND WRECKED IN ALGOA BAY, SOUTH AFRICA.

Figure 28: The *County of Pembroke*, berthed and the alleged wreck of the *County of Pembroke*. Two photographs from the book Square-Rigger Days (Domville 1938). The top picture is indeed the *County of Pembroke*. However, the bottom picture is actually the *Arnold*, wrecked in the gale of 1902; the same photograph is in the NMMM Library. The mizzen mast on the wreck is longer than the *County of Pembroke's* and the hull shape is also different.

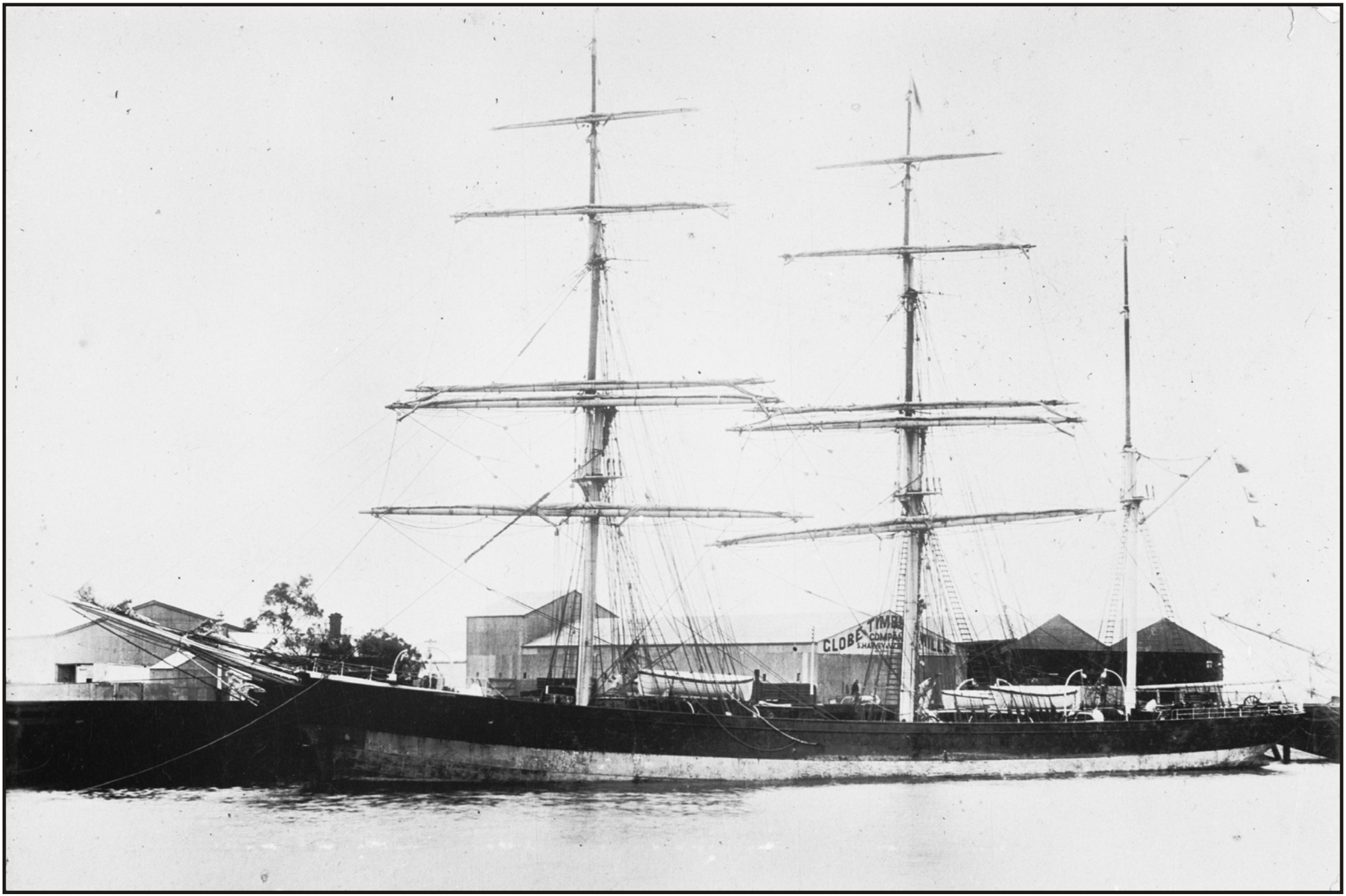


Figure 29: *County of Pembroke* berthed in front of the Globe Timber Mills Company, Port Adelaide, Australia (Bodie Collection H99.220/2045 N.D.)

Figure 30: This well known photograph from Museum Africa (PH2007-1869A) is from the Gale of 1902, the vessels from left to right are: *Content*, *Emmanuel*, *Oakworth* and *Iris*. Orpen (1967:129) states the *County of Pembroke* went aground "beyond the remains of the old wreck *Emmanuel*".

Figure 31: The stern of the vessel in the foreground matches the stern of the *Emmanuel* in Figure 30. Eyewitness accounts from 1903 state the *County of Pembroke* lost her jib boom when she collided with the *Lütto*. In this photograph from Museum Africa (PH2007-1253A), the barque in the middle ground has broken its bowsprit. During the 2004 and 2008 salvage we never found the *County of Pembroke's* bowsprit or figurehead. One of the boats is missing, which tallies with the account of Capt. Parry bringing the crew ashore.

Figure 32: The bow of the vessel in the foreground is the *Emmanuel*. In this photograph the *County of Pembroke's* bowsprit has fallen off, the side of the figurehead is visible. The sails are slightly unfurled as per the eyewitness accounts and the masts and spars are white as per Bisset's description. The vessel circled in the background is probably the hull of the dismasted *Lütto*.

County of Pembroke – An Eye-witness Description 1898 – 1903

The *County of Pembroke* was a barque; square rigged on the fore and main mast and fore-and-aft rigged on the mizzen mast (Bisset 1958:24). It was 221 feet long, 35 feet across and 20 to 29 feet deep, she had trim lines, a 'steel' hull, planked decks and 'steel' masts and yards. The *County of Pembroke* was low-slung amidships and as she lay at the wharf in Liverpool, her monkey poop (low poop deck) and fo'c'slehead were visible, but her main deck was below the level of the wharf (Bisset 1958:24-5).

As she was low-slung amidships, her freeboard was not more than 6 feet from the Plimsoll mark to the bulwark rail. This design allowed the main and fore sail to be set low on the masts, where the mast were the thickest and strongest. Conversely the low freeboard meant that when the barque was sailing on a tack in heavy weather, seas were shipped over the lee rail; sometimes the rail was under water for several minutes. As the vessel righted herself, water would surge along the main deck and empty out through the washports and scuppers (Bisset 1958:82).

Figure 33: Sailing vessel with the lee rail under and flooded decks (Bisset 1958:113)

At the stern of the barque, the poop deck's yellow pine planks had been 'holystoned as white as a hound's tooth', the teak rails varnished and the brass polished. The cabin skylight, wheel, ship's bell and the binnacle with a binnacle light for the compass could be seen from the poop. A maze of rigging and the yards crossed on the masts above. A weather cloth was attached to the mizzen rigging, protecting the poop deck from sun and rain. A short companionway, containing a clock, led from the poop deck to the Captain's cabin (Bisset 1958:25-6, 39-40, 58; Lloyds' Survey 1881).

The Captain's cabin was paneled in highly polished bird's eye maple. A polished table, with a bench on each side stood in the centre of the cabin; above hung a large, brass oil lamp suspended on three brass chains. A brass swinging tray contained tumblers and coloured wine glasses in slots. There was a sideboard with a marble top and a brass rail round it. The ship's oak medicine chest was secured to the white-scrubbed deck. Screwed to the bird's eye maple bulkhead was the barometer and above the cabin skylight. Across the back of the cabin was a red velvet setee and behind this, a set of polished transom lockers, where small stores were stowed. At each side of the cabin were doors, leading to the officers' cabins and to other compartments under the poop, including the sail locker, lamp locker, pantry and steward's cabin (Bisset 1958:26).

The officers' cabin accommodated two officers – the First and Second Mate. The steward's cabin accommodated the cook who combined the duties of the two posts. He oversaw the provisions and stores and was commonly referred to as 'the Doctor' (Bisset 1958:207).

The forward deckhouse contained the fo'c'sle, the half-deck, the carpenter's shop and the galley (working from forward). The fo'c'sle contained bunks for twelve seamen.

The half deck was not under the poop, as in some larger vessels, but was part of the forward deckhouse, adjacent to the fo'c'sle. It had six bunks, two on each side, fore and aft, and two in the middle, athwartships. Each bunk was six feet long and

two feet wide. A door on each side led to the main deck just abaft the fore rigging. There were six open lockers for eating utensils, a five-gallon drum for fresh water and the crews' sea chests served as seats. Three or four apprentices bunked here with the sailmaker and the carpenter. However, the carpenter sometimes chose to rig a hammock in his shop (Bisset 1958:30, 72, 73, 116).

Figure 34: Sailmakers working on deck under the supervision of the Mate (Bisset 1958:17)

The carpenter's shop had a porthole with a glass panel. The carpenter was a tradesman and therefore did not have to stand watch, he did his work during the day and could sleep all night unless he was turned out by a cry of 'All hands on deck'. As most of the masts, yards and hull were iron, his work was not as demanding as on a wooden vessel. The woodwork that he did have to care for included: blocks, belaying pins, rails, hatch battens, hatch boards, deck planking, top masts, spars, furniture and fittings (Bisset 1958:71-2).

The barque discharged her cargo in Antwerp on the 27th of March 1903. Bisset (1958:229-30) chose to leave the barque and travel to Liverpool at the owner's expense on 30th March 1903. The following extract is his closing statement on the *County of Pembroke*.

> "So ended my service in the *County of Pembroke*. Though I had served my apprenticeship in her on three voyages around the world, and she had been my roving home for nearly four and a half years, I left her without regret. The hatches were open, and her cargo of guano was being discharged with shore labour. She looked dirty and dingy and was decidedly smelly…. But as I stepped ashore for the last time from the old *County of Pembroke* and took a last look at her, alow and aloft, I suddenly realized that she had taught me whatever I had learned of the ways of the sea and that, with all her faults, I loved her still."

Crew of the *County of Pembroke*

Appendix B contains examples of crew agreements to sail the vessel from Antwerp, where she discharged her cargo, to her ballast berth in London. The crew consisted of 3 officers, 8 able seaman and an apprentice. There are also some examples of discharge forms with details of advances and balance of wages paid.

The barque's full complement was 22 hands, even though she was certified to carry 30 people. However, on the voyage from London to Algoa Bay she had 17 hands.

Normal crew	**1903 Voyage**	**1903 Voyage**
Captain	Captain	John Parry
First Mate	First Mate	Griffith Jones
Second Mate	Second Mate	Herbert Dunstan Marion
Cook/Steward	Cook/Steward	
Carpenter	Carpenter	
Sailmaker	Sailmaker	
12 Seamen	6 Seamen	2 deserted
4 Apprentices	3 Apprentices	William Hughes drowned
	2 Boys	
(Bisset 1958:27; Cape Daily Telegraph 27-11-1903)		

Crews' Duties

While cargo was being discharged, the crew were kept busy 10 hours a day. Duties included: chipping rust overside; scraping grass and barnacles from the hull as the lightened barque rose in the water; painting overside; overhauling the running and standing gear; serving and blacking down the rigging; sending down sails for the sailmaker to overhaul, and bending them again; greasing down the masts; painting the boats and deckhouses; polishing brass and woodwork and anything else necessary to keep her shipshape (Bisset 1958:92-3).

Once the ship entered the Atlantic and picked up the south-east trade winds, it was time for the crew to furbish the ship to make a good impression on the owners when entering the home port. These duties included, holystoning the decks as “white as a hound's tooth”, sand-and-canvassing the teakwood fittings and washing the paintwork. Holystones are pieces of sandstone – the process is as follows – each man gets a piece of canvas to kneel on and a block of wood (holystone), sand and water are sprinkled on the deck planks and then the 'holystones' are worked to and fro with the grain of the wood, for hours on end (Bisset 1958:108-9).

County of Pembroke's Stores

Stores for a twelve month journey consisted of: paint, tar, sails, ropes, wire and spunyarn. Food stores consisted of: casks of flour, sugar, peas, rice, biscuits, salt pork, salt beef and salt fish. These stores were stowed in lockers and the lazarette beneath the poop deck. Beef and pork were stowed in the 'tween deck. Beef was stored in tierces and pork in casks. When these were ready to use they were put in 'harness casks', and lashed to the poop deck rail then weighed out daily and sent to the galley for cooking. When salted fish went high i.e. rotten, it was taken to the main top and lashed there in a box until required. While crossing the equator, flying fish landed on deck and added variety to the ship's meals. All the fresh provisions of meat and vegetables only lasted about ten days. The lack of fresh provisions was the reason behind the cook issuing the compulsory Board of Trade ration of one fluid ounce of lime juice per man per day. This juice prevented beri-beri and scurvy. This ration caused British sailors to be nicknamed lime-juicers. The cook mixed lime juice with water and a bit of sugar then doled it out in pannikins. If a sailor refused to drink it he was fined. In addition to the juice ration, each sailor was issued five hard baked biscuits per day. The day's biscuit ration was kept in a box called a bread barge; it was hung to the deckhead in the half-deck and fo'c'sle to stop the rats getting to it. Cockroaches were another fact of shipboard life. After eighteen months at sea the crew were still fed on salt provisions taken in at the beginning of the journey. The meat came out of the harness casks green, yellow and stinking; the drinking water was stale and smelly (Bisset 1958:31, 34, 52-5, 71, 146).

Coal for the galley was stowed in the lower fore poop (Bisset 1958:32).

The only alcohol allowed on the barque, apart from what may be in the cargo, was locked in the Captain's cabin and was for emergencies only. The order 'splice the main brace' was given after any particularly arduous task. In this case, each member of the crew was given a tot of rum, apprentices were given a can of condensed milk (Bisset 1958:47).

Fresh water was contained in tanks, below deck, amidships and drawn from a pump (abaft the mainmast) in buckets once each day. As the water became smelly and stale, rainwater dripping off the sails and deckhouse roofs was collected in buckets and tubs (Bisset 1958:52).

The fat and scum the cook skimmed off pots in which salt beef and pork were cooked, was boiled down during the voyage to create a thick, greasy 'slush'. It was stored in two casks, under the fo'c'sle head. It was carefully hoarded by the cook,

and was his to sell at the end of the voyage. This slush was available to the crew as it was used for greasing down the masts and, when mixed with Stockholm tar, for splicing ropes (Bisset 1958:214).

County of Pembroke's Boats

The Lloyds' Survey of 1881 states that the barque had two life boats and two other boats. Bisset (1958:199, 219) describes four boats on the *County of Pembroke*. These were:

- Two lifeboats – one port, one starboard, both under davits
- Captain's gig – used to row the captain to shore in harbour, not under davits
- Dinghy – a light boat used for small jobs in port, not under davits

The Archaeology of the

County of Pembroke

Introduction

Archaeology is the scientific study of past human culture, interpreted through material remains. It is, by its nature, a destructive process. Maritime archaeology is the study of cultural remains related to exploration, use and interaction with the sea in order to understand and interpret our maritime history in relation to our general history. Once an item is removed from where it was originally deposited, it loses its context. The relationship between the artefacts and their environment can never be recreated (Delgado 1997:34, 259).

Archival research is a fundamental tool in underwater archaeology (Delgado 1997:34). Archival and other written sources on the *County of Pembroke* aided in fleshing out the story of the wreck, clarifying details of its construction. The Lloyds' Survey of 1881 (Appendix C) gave construction details that assisted in understanding the artefacts. The written sources give us a glimpse of the *County of Pembroke* before she ended up as a pile of corroding iron. Bisset's book, *Sail Ho*, allows us to taste the salt on his lips and feel the hunger pangs of the homesick fifteen year old that went to sea in a barque, not only nearing the end of its life, but also the end of an era. Archival sources add a dimension of historical drama when it is uncovered that a young man lost his life on the wreck.

The wreck of the *County of Pembroke*, along with all other wrecks and wreck materials over the age of 60 years are protected by the National Heritage Resources Act. As such, a permit had to be obtained for the removal of the wreck from the new Port of Ngqura, Eastern Cape. See Appendix D.

In an ideal world, the *County of Pembroke* wreck would have been left untouched and only excavated if a research design had been formulated that required excavation in order to answer specific questions that would expand our knowledge base on late 19th century ships and shipping. Even then, only sections would have been excavated in order to leave untouched areas for future research.

However, the wreck was in the middle of the new harbor development and as such needed to be removed, this process is known as rescue archaeology. Due to the implicit financial and time constraints of such an approach, the archaeologist retrieves as much information as possible before the development continues. The urgency of rescue archaeology dictates the extent of the information recovered.

There were a number of excavation possibilities.

1. The entire wreck could have been moved laterally and vertically to below the harbor bottom level.
    - This was done in Fremantle, Australia to the wreck *Day Dawn*, a mid 19th century American ship. Long-term monitoring of the site showed that the effects of the vessels using the harbor were contributing to the deterioration of the site. Attempts were made to bury the wreck deeper and cover it with more sediment. However, none of these solutions solved the long-term problems. Rather than cutting up and removing the wreck, it was moved to deeper water outside the harbor where it is used as a training site for maritime archaeologists (Delgado 1997:124).
    - Future development may require the Ngqura Harbour to be dredged deeper and the *County of Pembroke* would present a problem.

2. The *County of Pembroke* could have been lifted and moved outside of the harbor as was done in Fremantle, Australia. From an archaeological preservation point of view this is an ideal situation as it preserves the wreck for future archaeologists with research designs. There are a number of things that need to be noted here:
    - The authorities in charge of the Australian, *Day Dawn*, thought it was of sufficient archaeological value to preserve (Delgado 1997:124).
    - The *Day Dawn* was a 398-ton whaling vessel that was extensively stripped and burned to the waterline before it was sunk (Delgado 1997:124). The *County of Pembroke* weighed in excess of 1500-tons. The mechanics, costs and time requirements of such an operation are prohibitive. The *Mary Rose* in Britain took four years to lift and cost millions of pounds (Delgado 1997:264).
    - It would have exposed the *County of Pembroke* to sports divers and salvors who might remove sections of the wreck and thereby destroy the archaeological context. The integrity of the site would disappear over time and we would have lost an opportunity to study a remarkably well-preserved wreck from the late 19th century.

The course of action decided on, was to cut up and remove the entire wreck. Artefacts are being conserved and will be displayed at the Bayworld Museum, Port Elizabeth (Appendix D).

After removing the wreck, there were a number of possibilities:

- The remains could have been buried in an area where the water table is high enough to help preserve the wreck. This was done in Ketelhaven, Netherlands and long-term monitoring of the burial sites has revealed that due to agricultural developments in the area, the water table has lowered in the last twenty years allowing the burial site to dry out. This has accelerated the deterioration process (Delgado 1997:294-5). The Ngqura area is to be developed extensively, this will lower the water table and lead to the destruction of the buried wreck.
- The remains of the wreck could have been dumped at a designated site at sea. The disadvantage of this would be the difficulty in later research; this would be far outweighed by the advantages. That is, the wreck would remain in the environment in which it has reached equilibrium. The deterioration of the wreck would be far less than if it were buried below the unpredictable water table.

Ultimately, iron from the *County of Pembroke* was sold to scrap metal dealers. The profits will be used for the expensive conservation process of selected parts of the wreck at the Bayworld Museum, Port Elizabeth.

I only managed to dive three times on the *County of Pembroke.* Every dive was in the early morning to try for better visibility. However, the visibility was always bad, which is why there are not many photographs of the wreck in-situ. The entire project, from an archaeological point of view, was hampered by financial constraints; the salvors were under pressure to remove the wreck as soon as possible. Because the wreck was situated in the middle of the ships' turning circle, opening of the Ngqura Harbour was delayed.

The divers were enthusiastic in assisting the archaeological process and often brought up interesting pieces that they found while dredging. It is unfortunate that there was not the time to excavate properly as valuable data has been lost. The initial idea of working to quadrants proved unworkable in the field due to the hazardous nature of the site.

I believe, within the constraints inflicted upon the wreck removal, that everything possible was done to document the process. As an archaeologist, there is never enough time.

Deterioration of the 2004 Debris Removal Project Artefacts

Figures 35 - 36: 2007 - Dump site from the Debris Removal Project was moved to the veld next to the Transnet site office. The following photographs document the deterioration the artefacts have undergone during the last three years. Rust and humans are the main agents of destruction. (Photos V. Maitland)

2004

2007

Figures 37 - 38: While the materials appear to be as coated with rust in 2004 as they are in 2007, in 2004 it was a light layer over an unaffected core .After three years the rust had eaten into the iron and is corroded the core. The onion-peel look bears this out. In addition, all the dead-eyes have been removed by persons unknown. (Photos V. Maitland)

2004

2007

Figures 39 - 40: The mast top has deteriorated substantially. In addition to rust, damage was sustained when the artefacts were moved. The wood has dried out and is warped and cracked. (Photos V. Maitland)

2004

2007

Figures 41 - 42: Corrosion has damaged the head beam further. As it is a fairly substantial piece of iron, human factors have fortunately affected it little. (Photos V. Maitland)

2004

2007

Figures 43 - 44: This rigging gear has become severely damaged in the last three years. It collapsed in places as the rust ate into the core metal. (Photos V. Maitland)

County of Pembroke Wreck Site

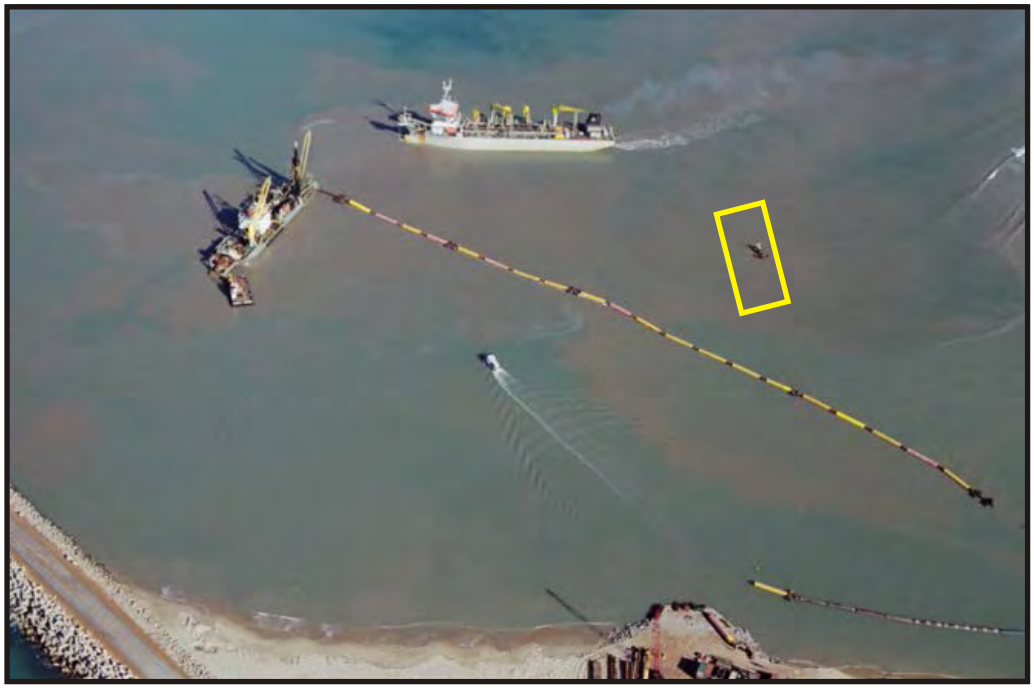
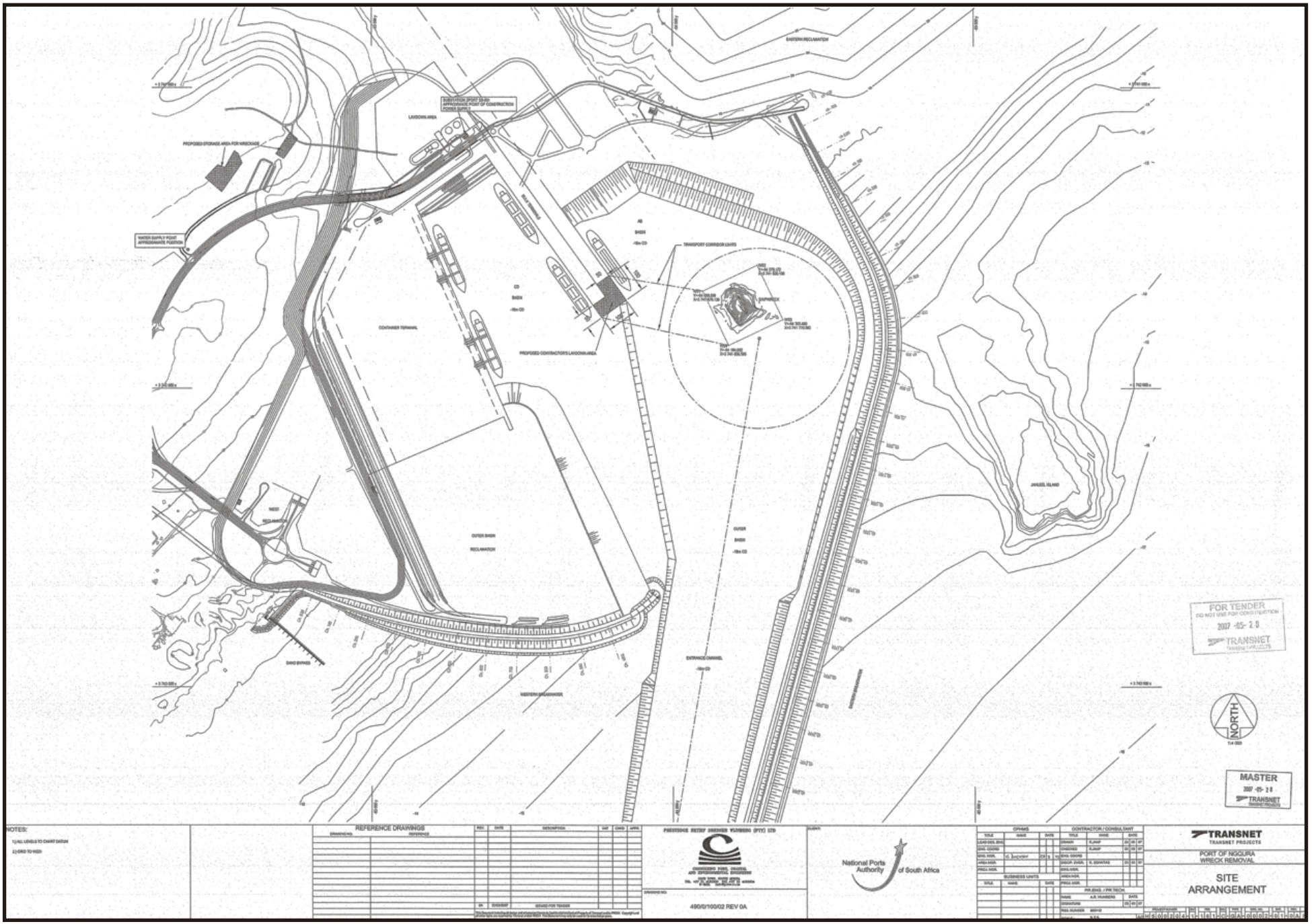


Figure 45: Aerial view of the barge anchored over the wreck site in 2004. Large dredgers can be seen working around the site. (Photo Subtech)



Map 3: Map of the Port of Ngqura showing the location and depth of the *County of Pembroke* (Picture Transnet)

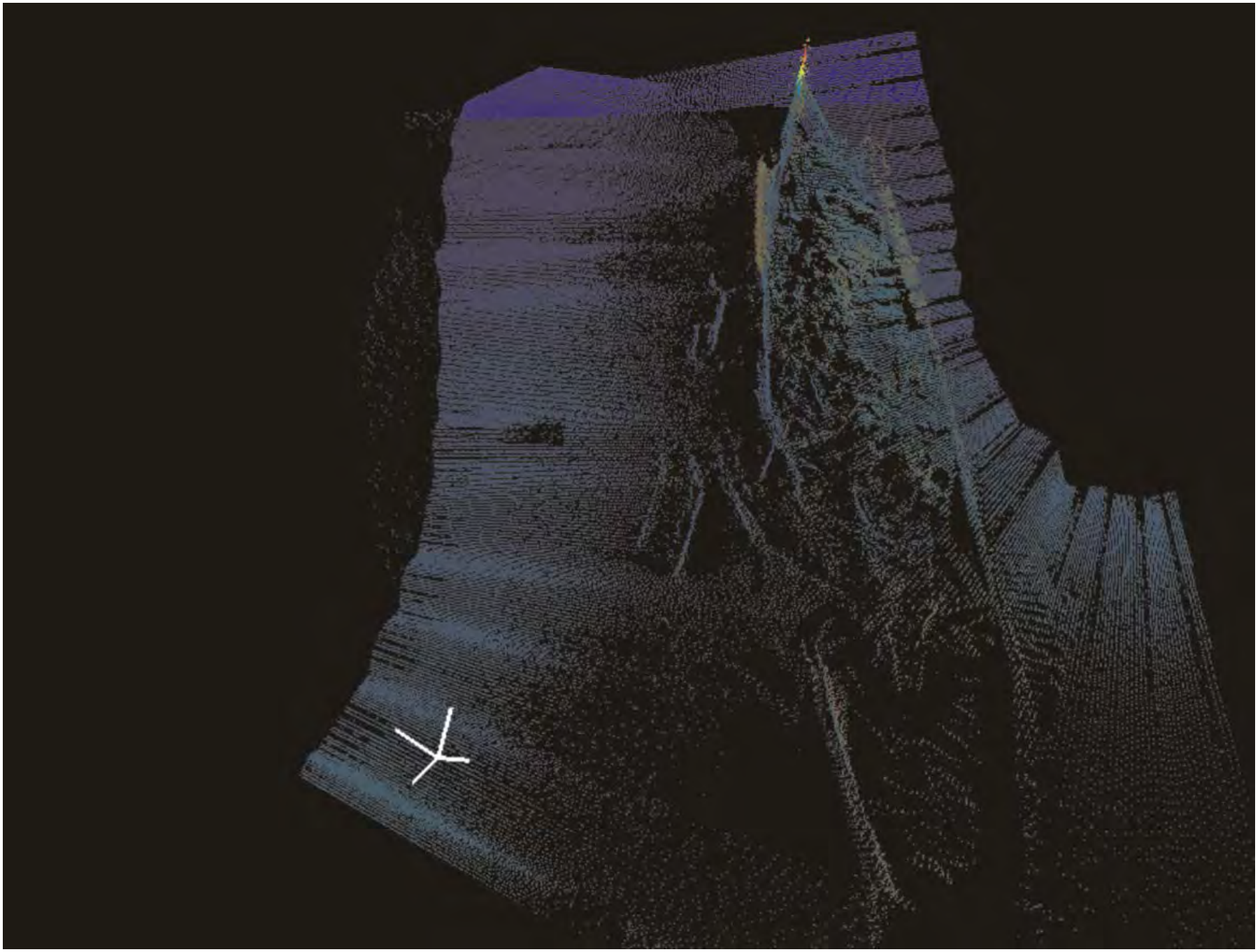


Figure 46: Multibeam survey from 2004, the debris field around the main structure is clearly visible. (Picture Transnet; All multibeam survey screenshots available in Appendix E)

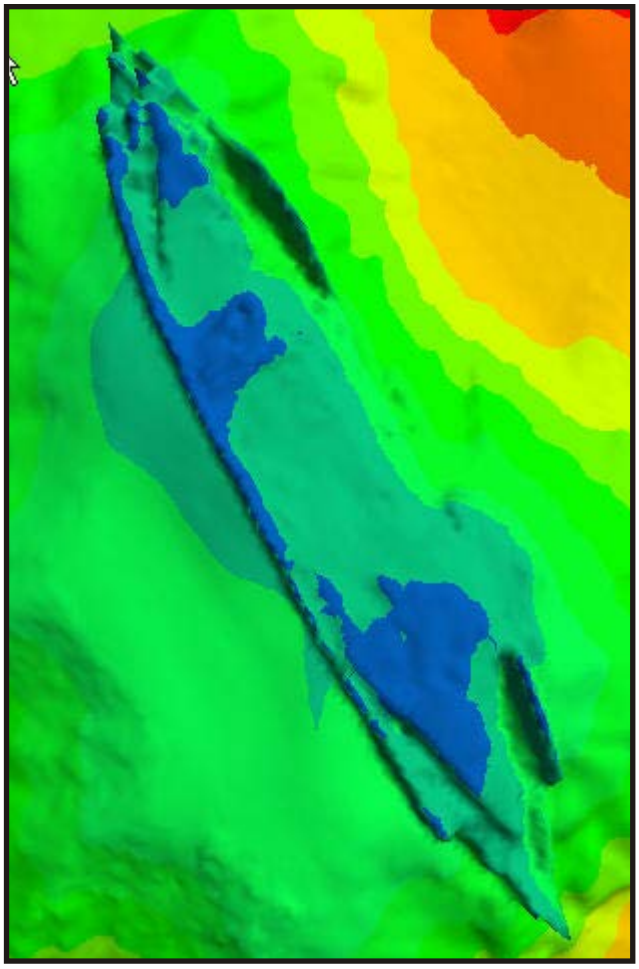


Figure 47: Multibeam survey from 2007, the wreck is sitting on a pinnacle of sand. (Picture Transnet; All multibeam survey screenshots available in Appendix E)

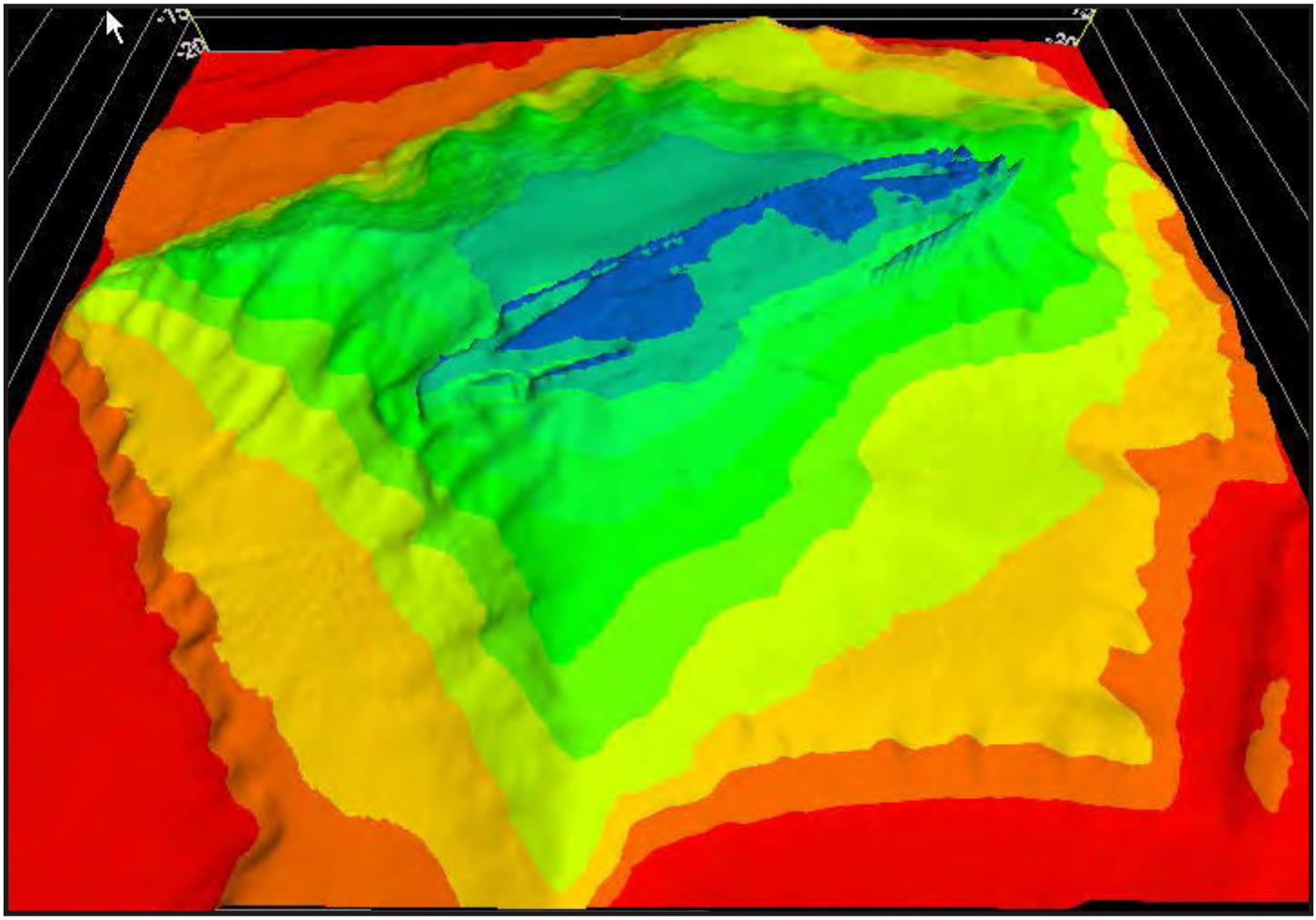


Figure 48: Multibeam survey from 2007, the wreck is sitting on a pinnacle of sand. (Picture Transnet; All multibeam survey screenshots available in Appendix E)

Figure 49: The barge, *Ubejane,* anchored on-site. A four-point spread is used over the wreck site. This allows the barge to be moved to any point on the wreck for lifting. (Photo V. Maitland)

Figure 50: The 'classifier' is attached to the barge, was supposed to catch any small items dredged up. But it was not used. The debris passed through the dredge pump and the impeller broke everything up, nullifying the classifier. (Photo V. Maitland)

Figures 51 - 52: The dredge hose is used to remove silt overburden from the wreck. The grid on the front prevents large objects from being sucked up. (Photos V. Maitland)

Figures 53 - 54: Subtech divers suit up for their 2-3 hour shift. There are two divers per shift and diving is from 06h00 to 18h00, 6 days a week. Later another team was added to work the stern section. (Photos V. Maitland)

Figure 55: Subtech diver working on the wreck. (Photo

Figure 56: Small artefacts are placed into this bucket while the divers are working. (Photo V. Maitland)

Figure 57: At first, wire gabions were used for lifting objects, however they were too weak and collapsed on retrieval. (Photo V. Maitland)

Figure 58: A hydraulic underwater jack hammer is used to break up large sections of conglomerate. (Photo V. Maitland)

Figure 59 - 60: Metal bins were brought in to replace the gabions. These are very efficient as they lift large amounts and cause less damage to artefacts. (Photos V. Maitland)

Figure 61: Explosive charges on the barge deck. Once all the loose material had been removed from the wreck site using dredging and manpower, Subtech used explosives to break up the conglomerated wreck. (Photo Subtech)

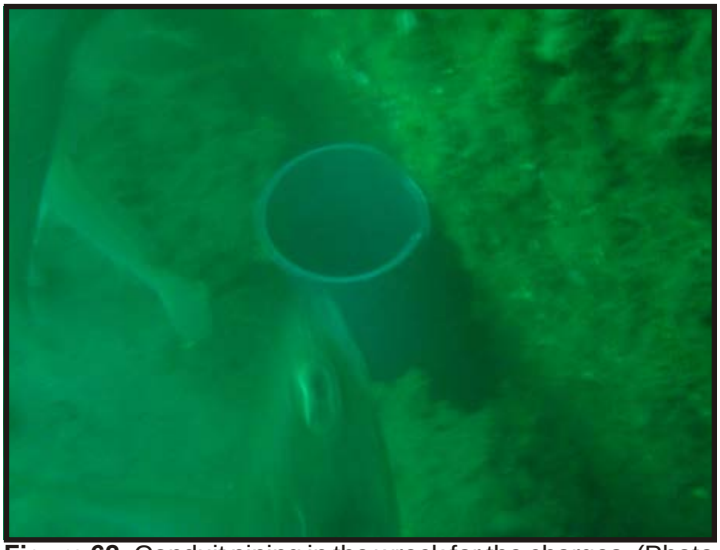


Figure 62: Conduit piping in the wreck for the charges. (Photo Subtech)

Figure 63: Sandbags packed onto the wreck to contain and control the direction of the blast. (Photo Subtech)

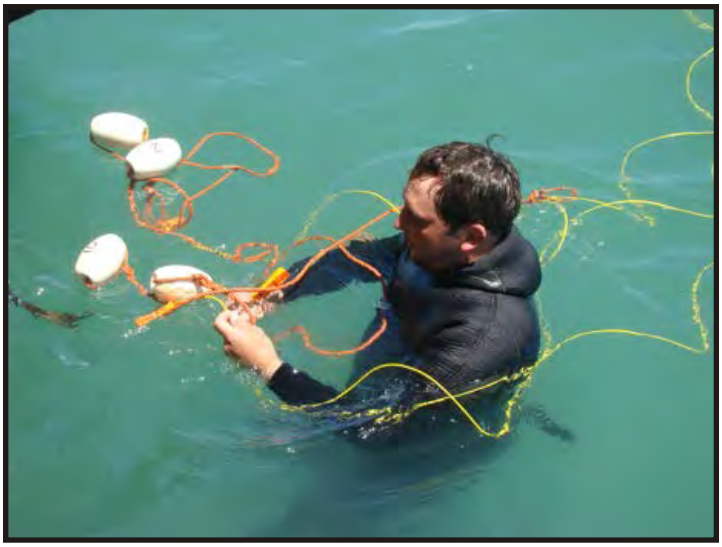


Figure 64: Organising the shock tubes to the charges. (Photo Subtech)

Figure 65: The blast. (Photo Subtech)

Figure 66: Post-blast, the side plating has been seperated. (Photo Subtech)

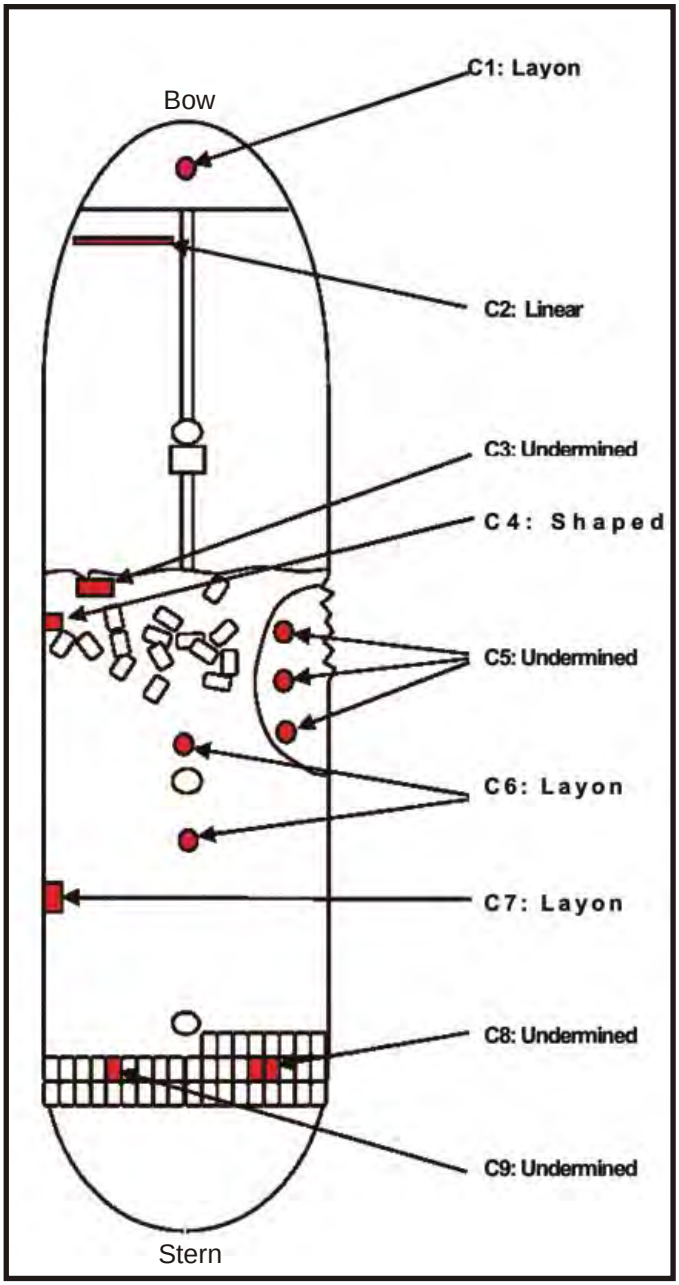


Figure 67: Blast 1, pre and post-blast

07-11-2007

C1 -

Location: Hole in the bow

Result: Growth was cleared away, port bow has a tear in it, lots of loose metal debris

C2 -

Location: Linear charge on port deck

Result: Lifted and scattered the decking

C3 -

Location: A small tunnel was excavated under boxes and coal

Result: Scattered everything from the area

C4 -

Location: Shaped charge on the inside of the port side plating

Result: Large tear in the side plating

C5 -

Location: Three charges were placed in an excavated hole under the keel

Result: Plating loosened completely, debris consisting of wood and barrels exposed, circular part of the deck blown off

C6 -

Location: Charges laid on the deck near the main mast

Result: As they were merely laid on the deck there was little effect

C7 -

Location: Charges laid on the plating

Result: Little effect on the structure, some growth was removed

C8 -

Location: Two charges were placed under the barrels in a layer of coal.

Result: The hard conglomerate around the barrels was loosened allowing them to be removed manually

C9 -

Location: One charge was laid between the barrels

Result: It obliterated the barrels

(Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

Blast 2 - Subtech Blast Plans

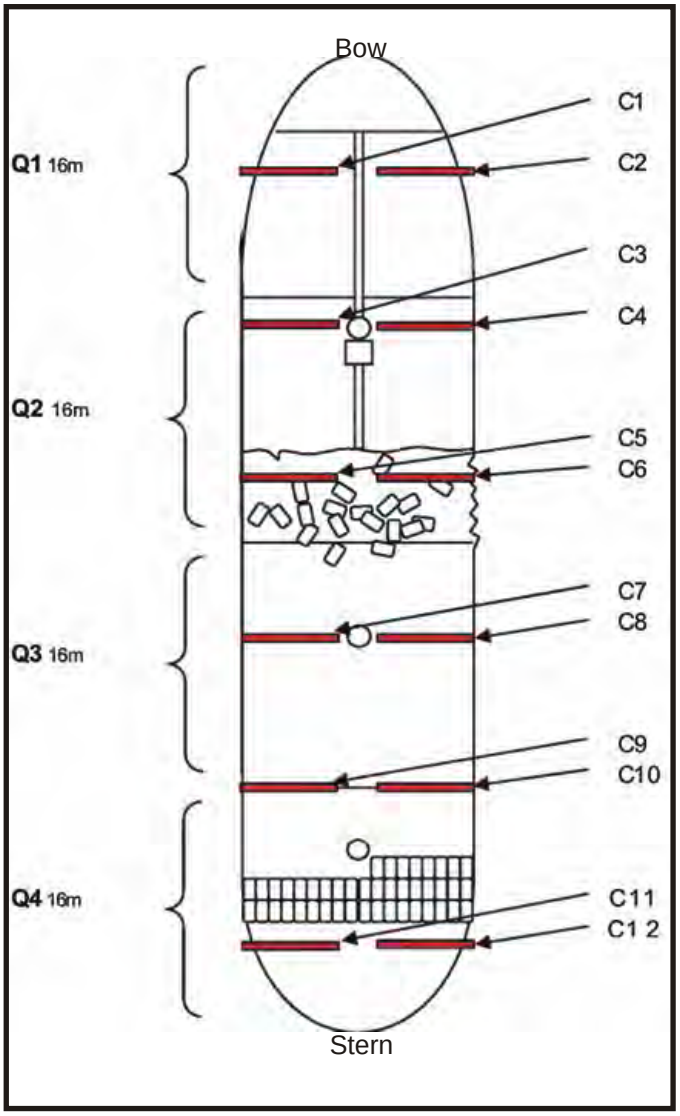


Figure 68: Blast 2, pre-blast
15-11-2007

The first blast revealed that the best results were achieved when the charges were contained and directed. The divers used an air lance to place conduit pipes (160mm x 2m), for the charges, under and alongside the hull. The charges were placed in 110mm x 2m pipes on the surface and these charges were put in the conduit pipes.14 charges were laid along the entire length of the wreck. (Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

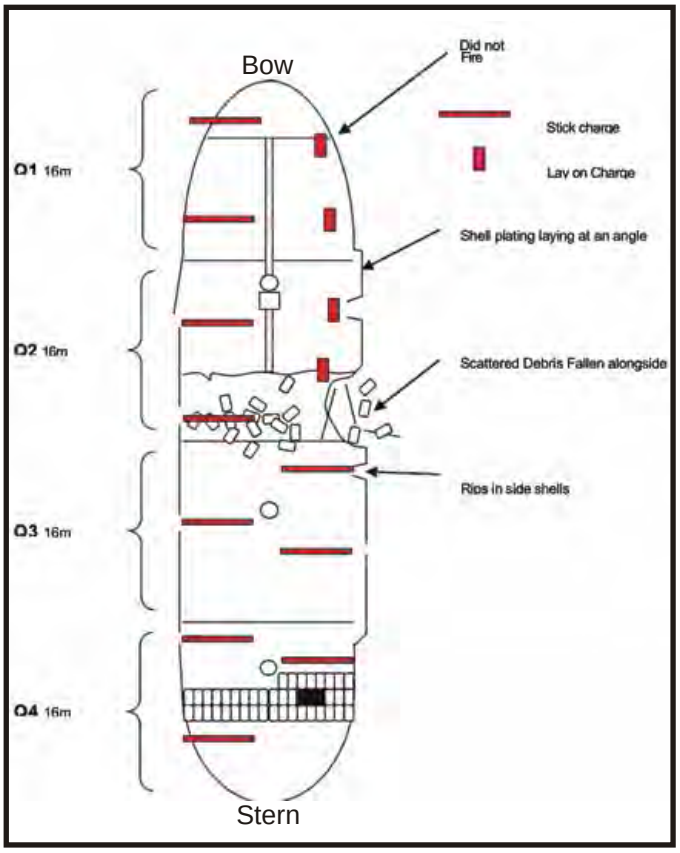


Figure 69: Blast 2, post-blast
20-11-2008

- The bow and stern were still intact and in the same position.
- Midships, the side plates on the port and starboard sides tore and were leaning outwards.
- Barrels, plating and decking strewn over the site

(Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

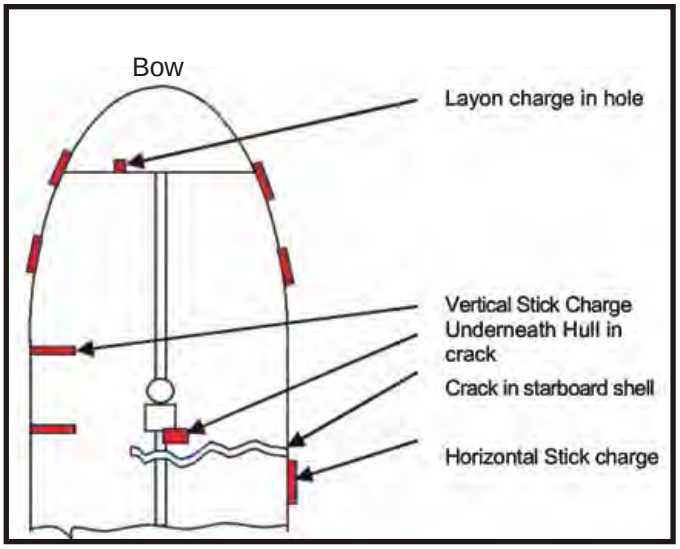


Figure 70: Blast 3, pre-blast
26-11-2007

During the clean up dredging from blast 2, a crack was found in the starboard plating, a result of the previous blast. (Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

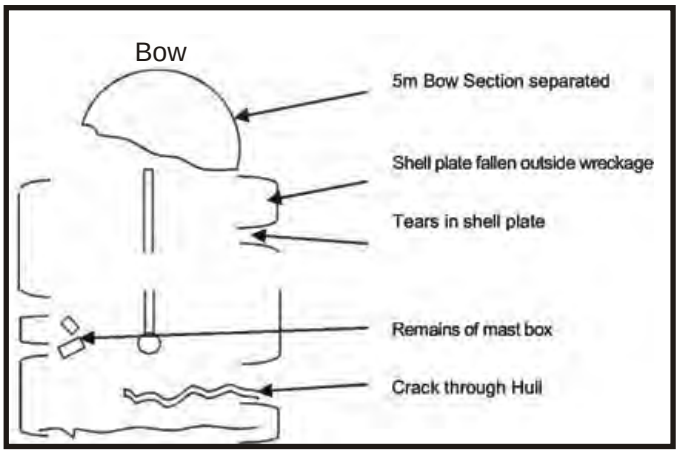


Figure 71: Blast 3, post-blast
29-11-2007

- A 5m section of the bow was sheared off
- Mast box to the port side
- Debris scattered over 20m radius

(Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

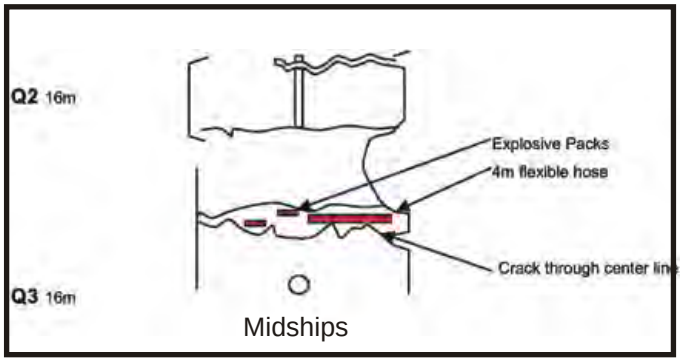


Figure 72: Blast 4, pre-blast
02-02-2008

A trench was dredged midships, explosives in a 4m flexible hose was packed in this trench on the starboard side against the hull. On the port side two explosive charges were packed. Sandbags were used to contain the blast. (Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

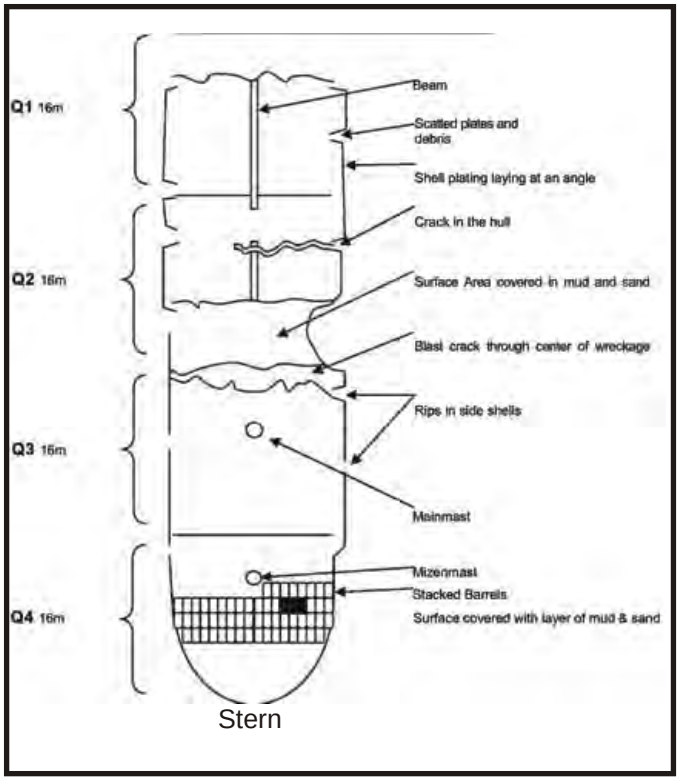


Figure 73: Blast 4, post-blast
04-02-2008

The charges went off successfully and cracked the wreck on its centre line. Side plating was also loosened. (Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

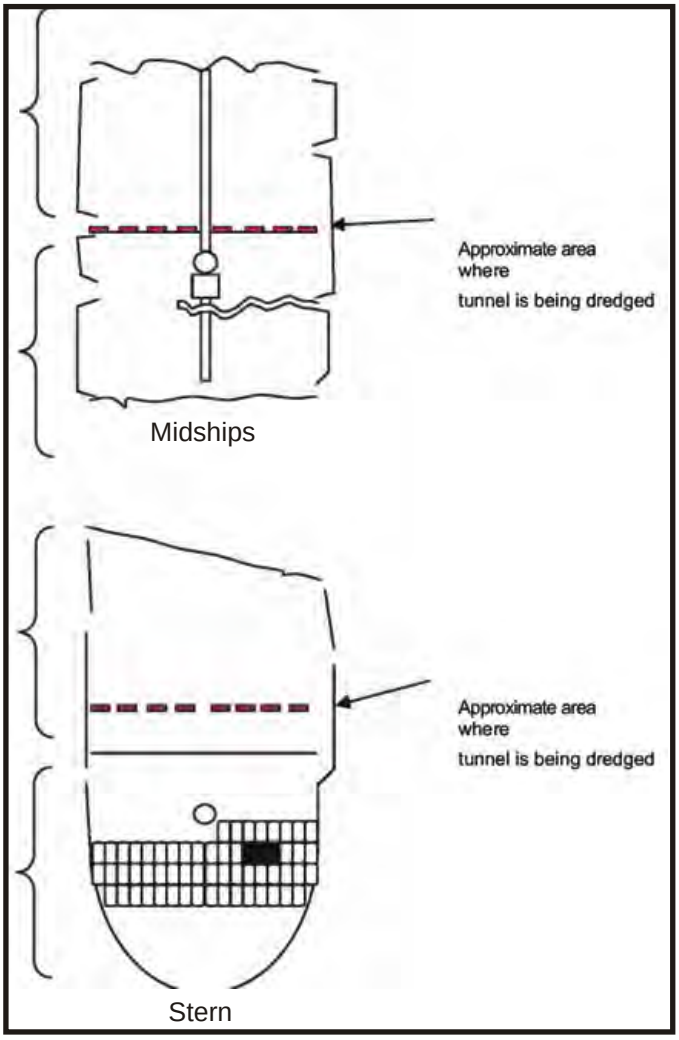


Figure 74: Blast 5, pre-blast
05-02-2008

Trenches were dredged on each side of the two remaining hull structures. Explosives were packed in 3m lengths into conduit piping under the hull. (Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

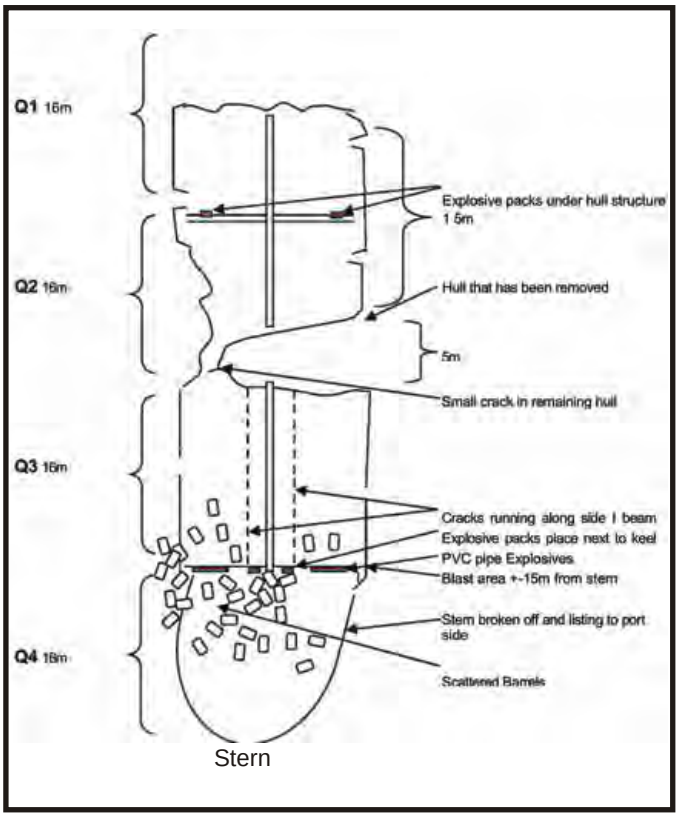


Figure 75: Blast 5, post-blast
05-02-2008

- The stern section broke off, scattering barrels over the site
- The remaining section towards the bow broke into numerous pieces
- The midship section has two cracks, either side of the keelson. (Subtech reports for Transnet Appendix F; Drawing Neil Myburg)

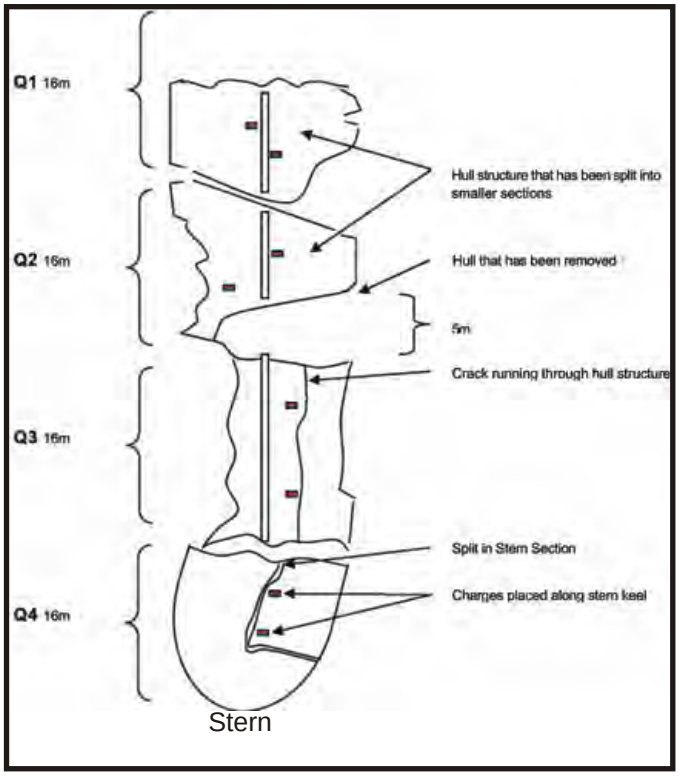


Figure 76: Blast 6, pre-blast
11-02-2008

Eight small charges were laid on the larger pieces of the wreck in order to break up the last structures. (Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

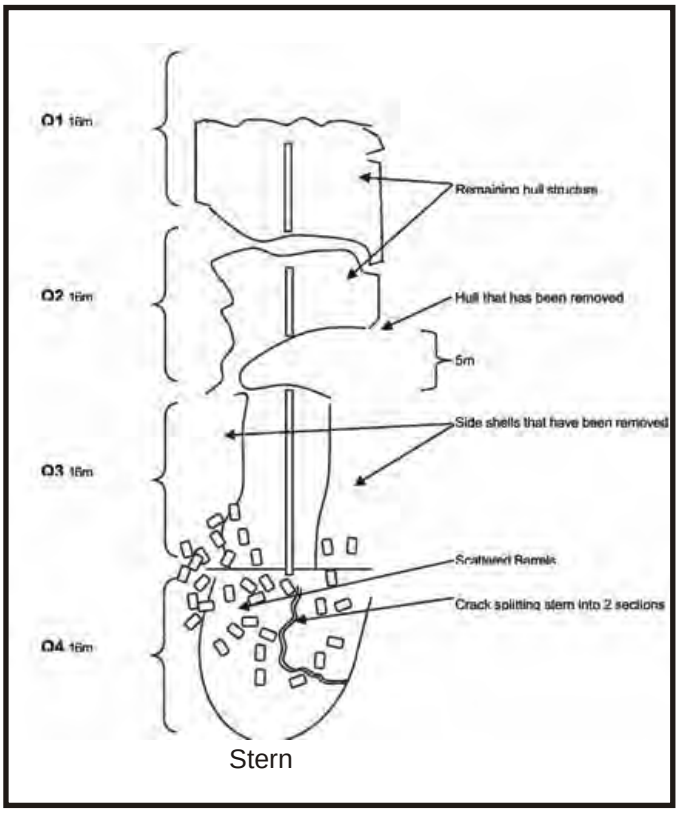


Figure 77: Blast 6, post-blast
15-02-2008

The remaining wreck structure broke into manageable pieces that could be lifted. (Subtech reports for Transnet - Appendix F; Drawing Neil Myburg)

Figure 78 - 80: Crocodile grab. A crocodile grab on the *Aegir* barge was used to grab chunks of the wreck. (Photos V. Maitland)

Figure 81: 2 x 3m section of side plating. The hull was cut underwater using broker rods and then lifted onto the deck of the *Ubejane.* (Photo V. Maitland)

Figure 82: *Ubejane* being brought to the quay side to unload the wreck and to collect supplies. (Photo V. Maitland)

Figure 83: When the deck of the barge is full and all the bins have been lifted off the wreck, the barge is brought alongside and the artefacts hoisted onto the quay. (Photo V. Maitland)

Figure 84: The barge *Ubejane* unloading pieces of the wreck. (Photo V. Maitland)

Figure 85: The barge *Aegir* unloading pieces of the wreck. (Photo V. Maitland)

Figure 86 - 87: The artefacts are stored in a fenced-off area. Smaller pieces are stored in metal drums and immersed in sea water if necessary. Interesting artefacts are stored in locked containers before they are transported to Bayworld for conservation. (Photos V. Maitland)

Figure 88 - 89: Large pieces of the hull being loaded onto a truck for transport to the dump site. (Photos V. Maitland)

Figure 90: Conserving marine life. Every effort was made to return marine creatures to the sea. (Photo V. Maitland)

Figure 91: View of the harbour from the dump site. (Photo V. Maitland)

Figure 92: The Dump Site.
Co-ordinates: 33° 47.438' S
25° 42.041' E

Iron from the dump site was sold to a scrap metal dealer, the funds will be used by Bayworld Museum to conserve selected artifacts. See Appendix D. (Photo V. Maitland)

The Construction of the

County of Pembroke

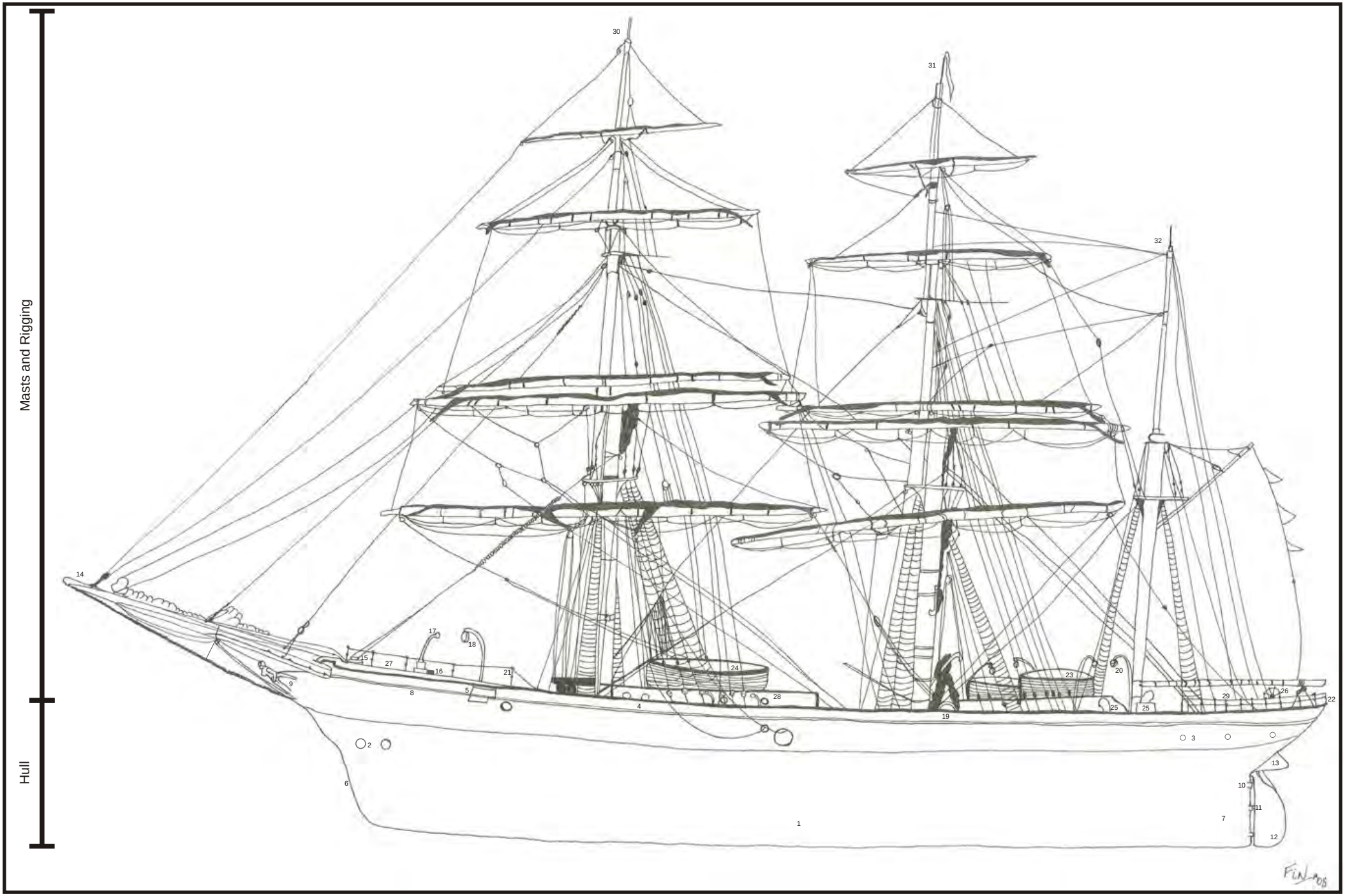


Figure 93: Line drawing of the *County of Pembroke*. (Drawn by V. Maitland from *County of Pembroke* photograph (Brodie Collection H99.220/2045) and discussions with Subtech diver, Colin Donald 2008)

Key to *County of Pembroke* line drawing - Figure 93

1. Hull
2. Hawsepipes
3. Portholes
4. Bulwarks
5. Scuppers and Washports
6. Bow
7. Stern
8. Rubbing Strake
9. Figurehead
10. Gudgeon
11. Pintle
12. Rudder
13. Steering Gear
14. Bowsprit
15. Bollards
16. Cathead
17. Cat Davit
18. Cargo Davit
19. Water Pump
20. Radial Davit
21. Pulpit Rail
22. Pushpit / Monkey rail
23. Life Boats under davits
24. Captain's gig and dinghy, not under davits
25. Ventilators
26. Helm / wheel
27. Fo’c’sle
28. Forward Deckhouse
29. Poop Deck
30. Fore mast
31. Main mast
32. Mizzen mast

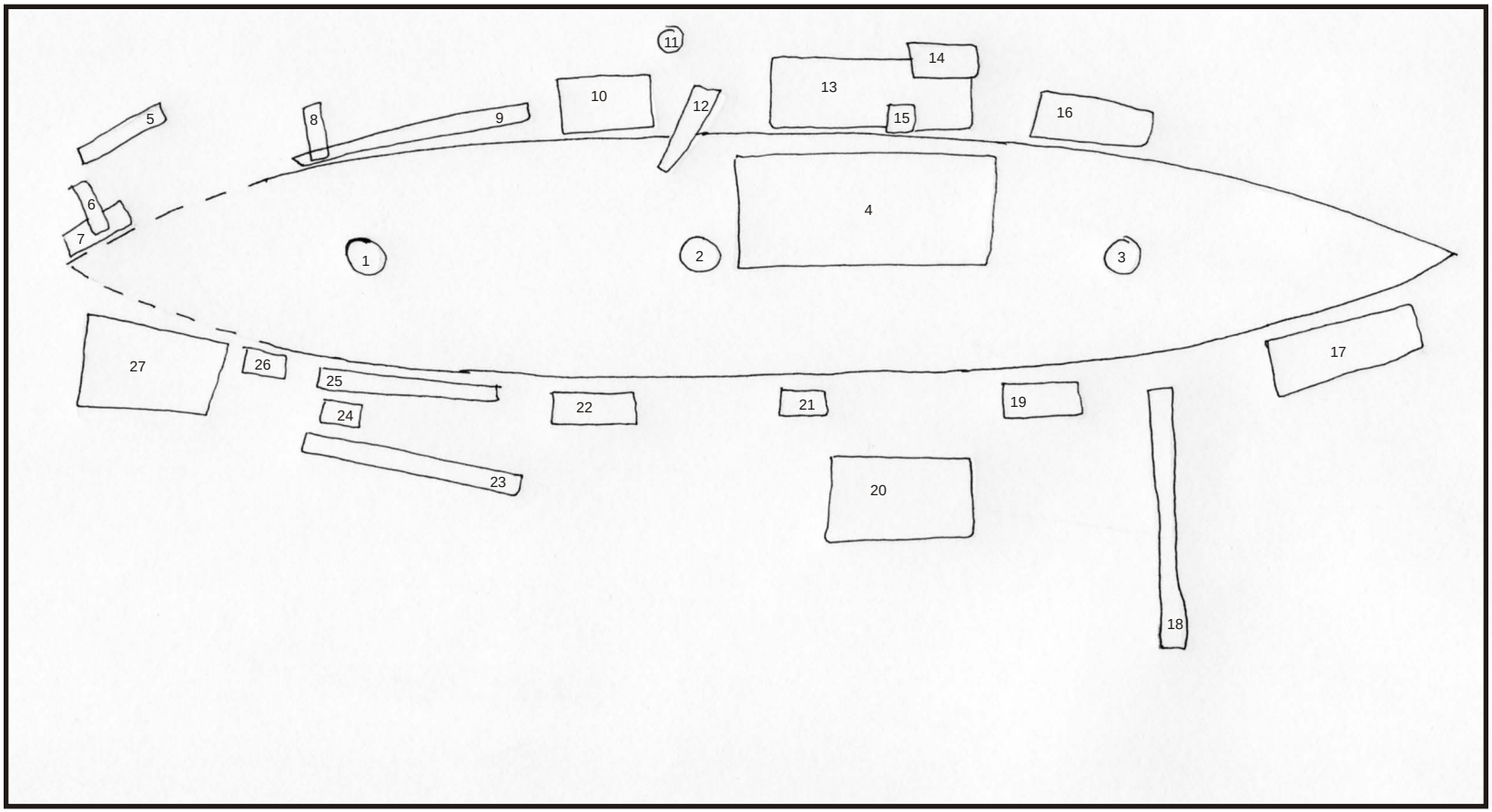


Figure 94: *County of Pembroke w*reck layout showing the main structural artefacts from 2004. (Drawing V. Maitland)

Key

1. Fore mast stump
2. Main mast stump
3. Mizzen mast stump
4. Deck plating - Figure 205
5. Square beam - Figure 151
6. Cathead - Figure 342
7. Bolster - Figure 411
8. Short mast section
9. Channel - Figure 228
10. Hull plating
11. Porthole - Figures 201 - 202
12. Mast section
13. Hull plating
14. Bollard - Figure 312
15. Barrel
16. Hull plating
17. Hull plating
18. Main mast - Figure 452
19. Gunwale - Figure 223
20. Hull plating with 'tween deck
21. Dead-eye
22. Railings - Figures 393 - 394
23. Fore mast - Figure 449
24. Bollard
25. Bulwark - Figure 219
26. Deck rigging - Figure 46
27. Bow plating - Figure 253

The Hull

According to the Lloyds' Survey of 1881(Appendix C), the *County of Pembroke* was a two decked, iron hulled vessel, 210' 6" long (64.160m), 35' (10.668m) wide and 21' 1.5' (6.438m) deep.

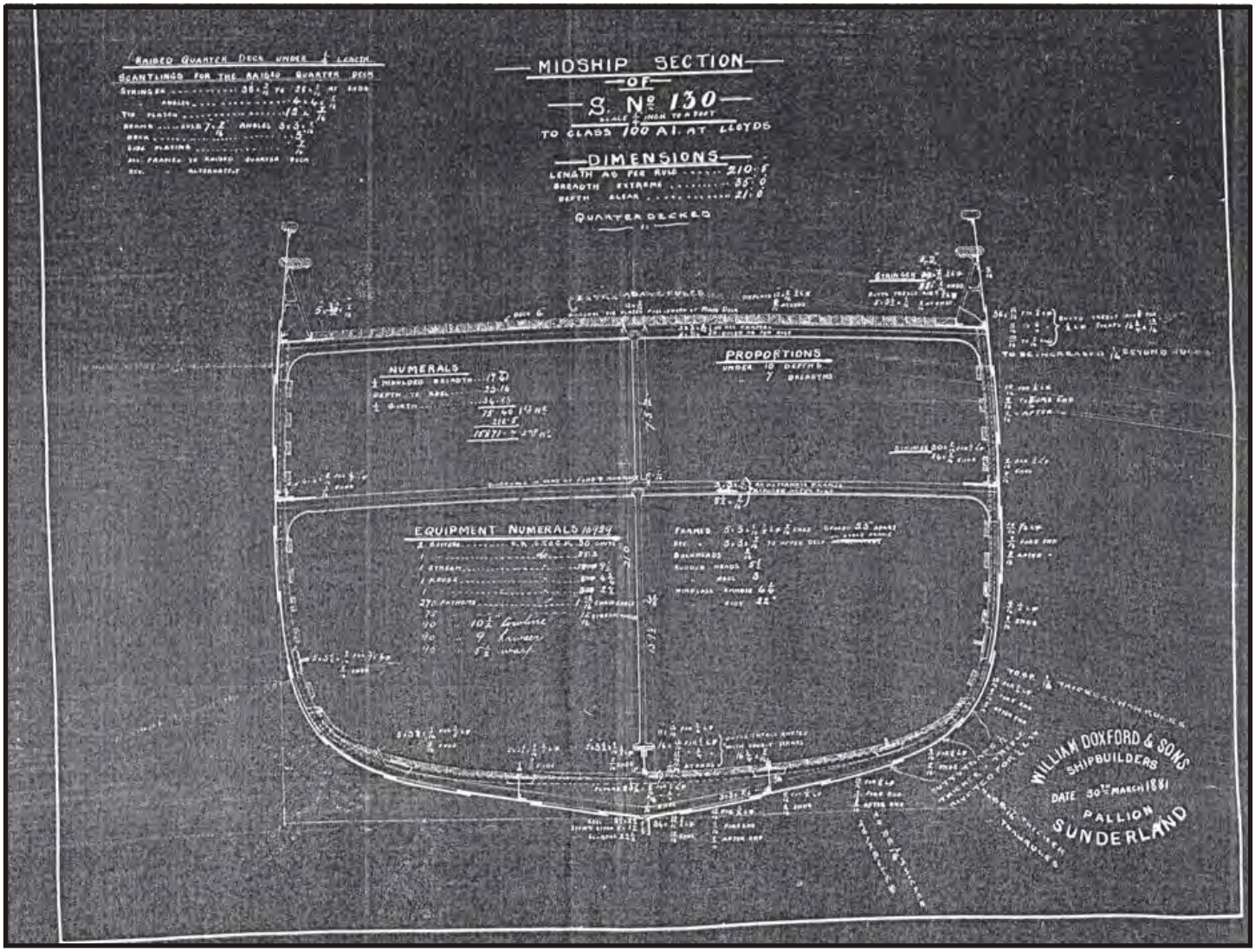


Figure 95: Midship section of the *County of Pembroke*, from the plans of the shipbuilders Doxford & Sons, Sunderland. (Lloyds' Survey 1881)

From initial dives, in 2004, Subtech determined that the hull was largely intact. The harbour was being dredged at the time and parts of the wreckage lying around the hull were a hazard to the dredgers. Therefore, Subtech removed all this peripheral wreckage. This included a number of mast lengths, side plating, bulwarks and some decking. During this process, a section of the hull was brought up. Colin Donald and Malcolm Turner determined that the name of the wreck was the *County of Pembroke*. Once we knew the identity of the vessel, research into its background and potential significance commenced. Figure 95 are the exact measurements and structures within the hull.

The study of the archaeological remains expands our understanding of the construction of iron sailing vessels in the late 19th century. The first iron sailing vessels constructed, drew entirely on the architecture of wooden ships. As the shipbuilders began to understand their material's strengths and weaknesses so marine architecture evolved. The *County of Pembroke* was a transitional vessel. Many of her structures are drawn directly from wooden shipbuilding and others were firmly in the steel architecture of later times. Some of the features used in her construction remain unchanged to this day. Analysis of three iron samples was undertaken by the CSIR in 2006, not surprisingly the iron was poor quality, consistent with the rudimentary steel making practices of the late 1800s (Mkhize 2006: Appendix G).

In the following pages I have tried to find technical drawings of average iron merchant ships from this period and compared them to the structural artefacts removed.

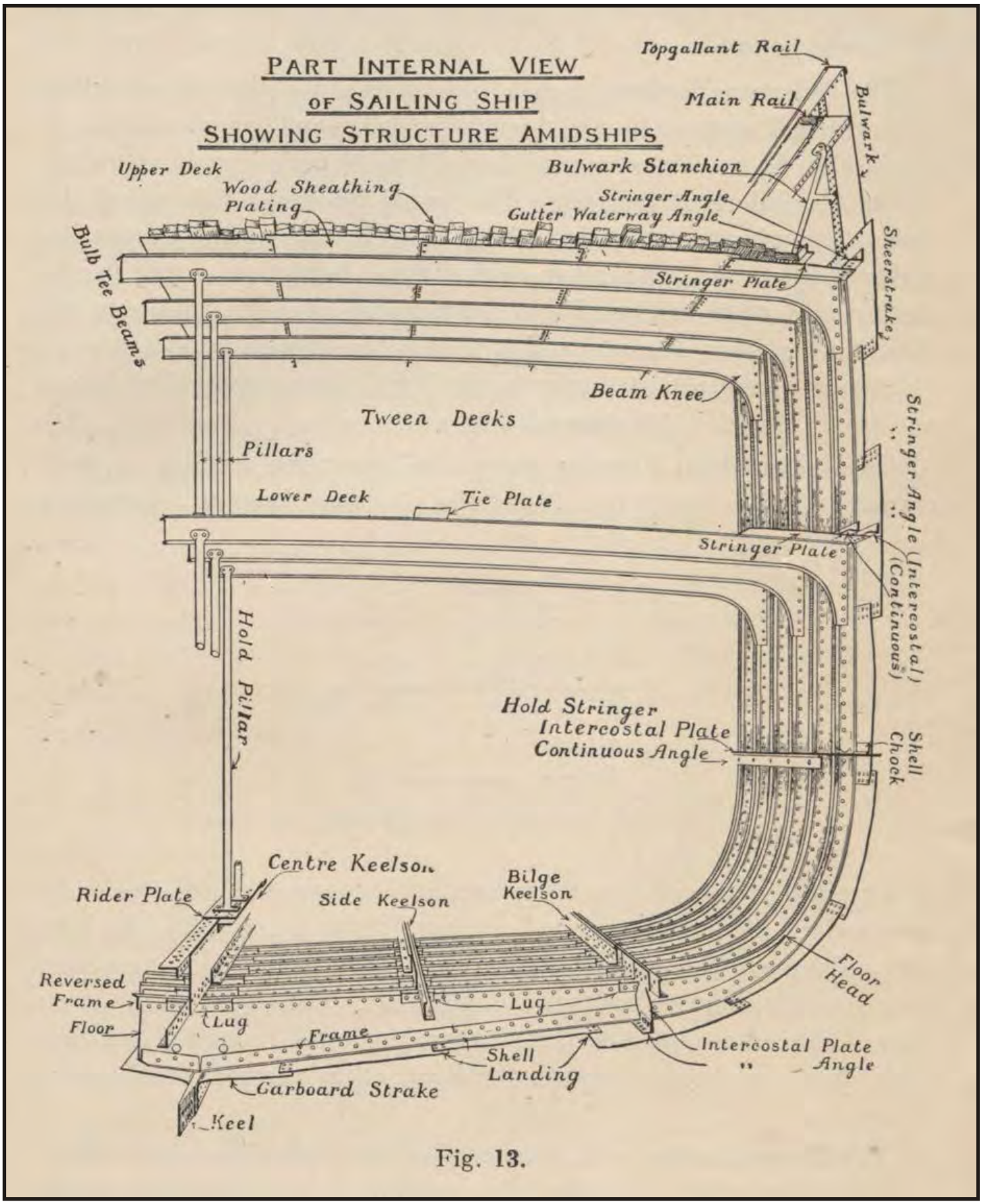


Figure 96: Cross-section of an iron sailing vessel. It proved useful in the study of the *County of Pembroke* and shows additional features. (Drawing Brown 1931:433)

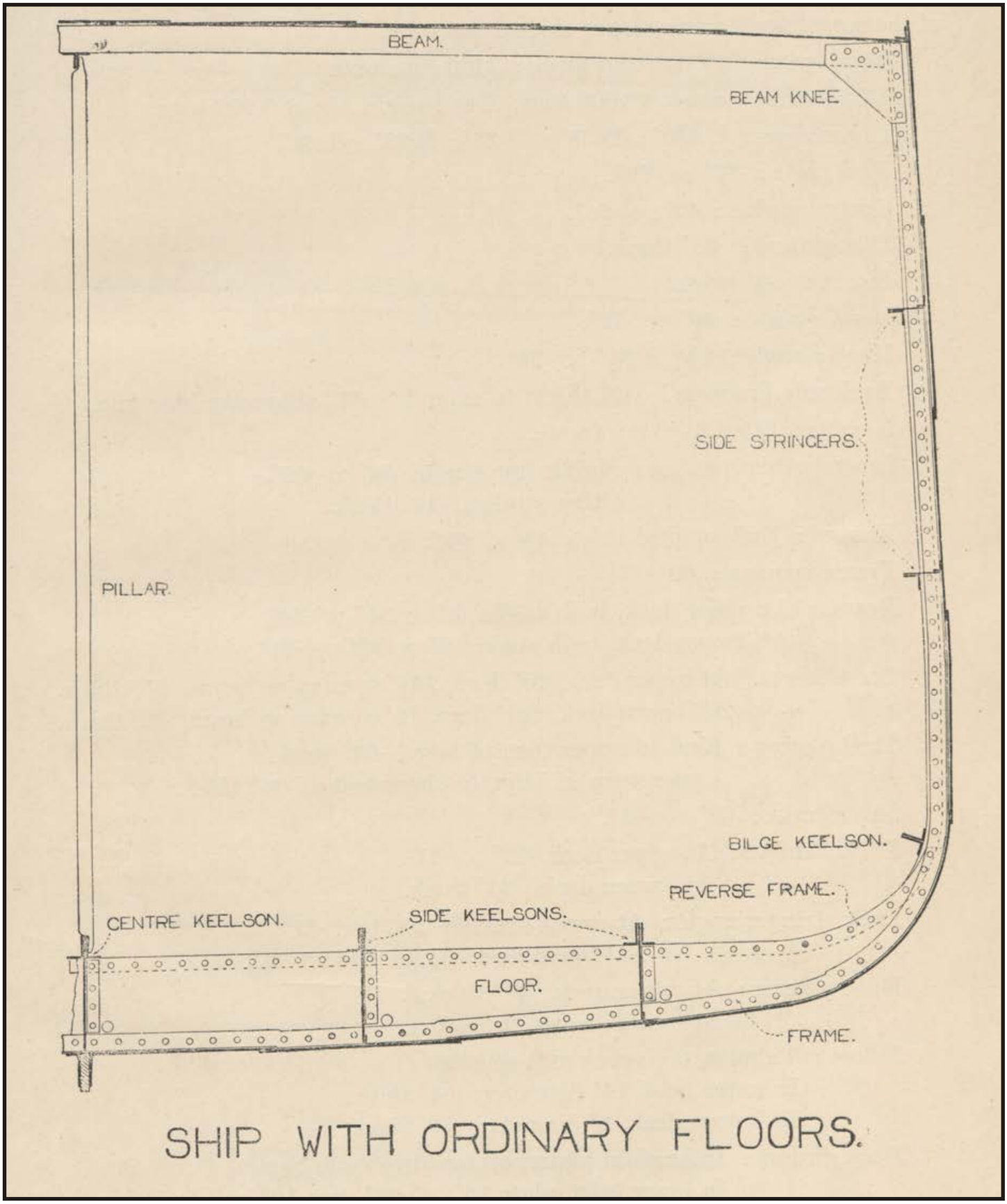


Figure 97: Diagram of a ship with ordinary floors. It shows all the structural parts of the hull and should be used in conjunction with the following pages. (Pursey 1942:25; Drawing H.J. Pursey)

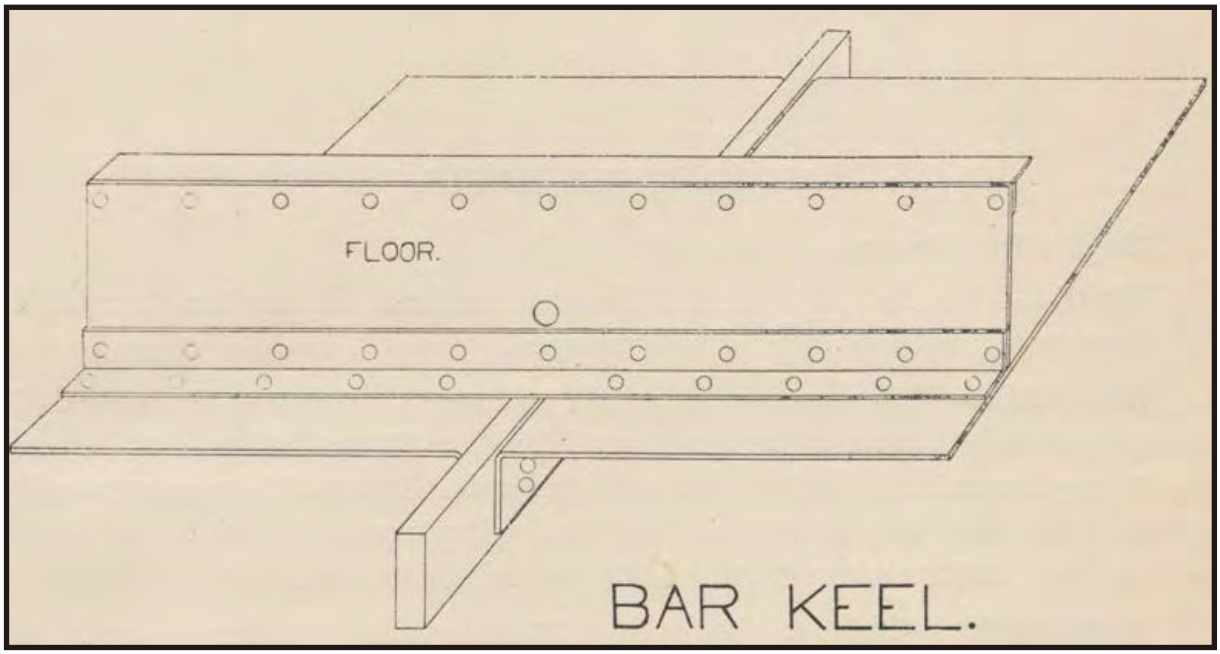


Figure 97: Diagram of a bar keel. The bar keel was the first type to be used when ship building switched from wood to iron. It was later discovered that it did not add sufficient strength to the structure of large vessels as there was no direct connection between the keel and the floor. The depth of the bar is three to six times its width and is made in lengths of thirty to sixty feet. These are joined by vertical scarphs, which have a length of nine times the thickness of the keel. The garboard strake can be double, chain or zig-zag riveted to the keel. (Pursey 1942: 34; Drawing H.J. Pursey)

Figure 99: Floor showing bar keel, frames and keelson. (Photo V. Maitland)

Figure 100: Close-up of bar keel and garboard strakes. (Photo V. Maitland)

Figure 101: Bar keel from underneath, showing the corroded garboard strake. (Photo V. Maitland)

Figure 102: Keel from above, showing where the frames were riveted to the garboard strake. (Photo V. Maitland)

Figure 103: Keel and garboard strakes. (Photo V. Maitland)

Figure 104: Zig-zag riveting of the garboard strake to the bar keel. (Photo V. Maitland)

Plating

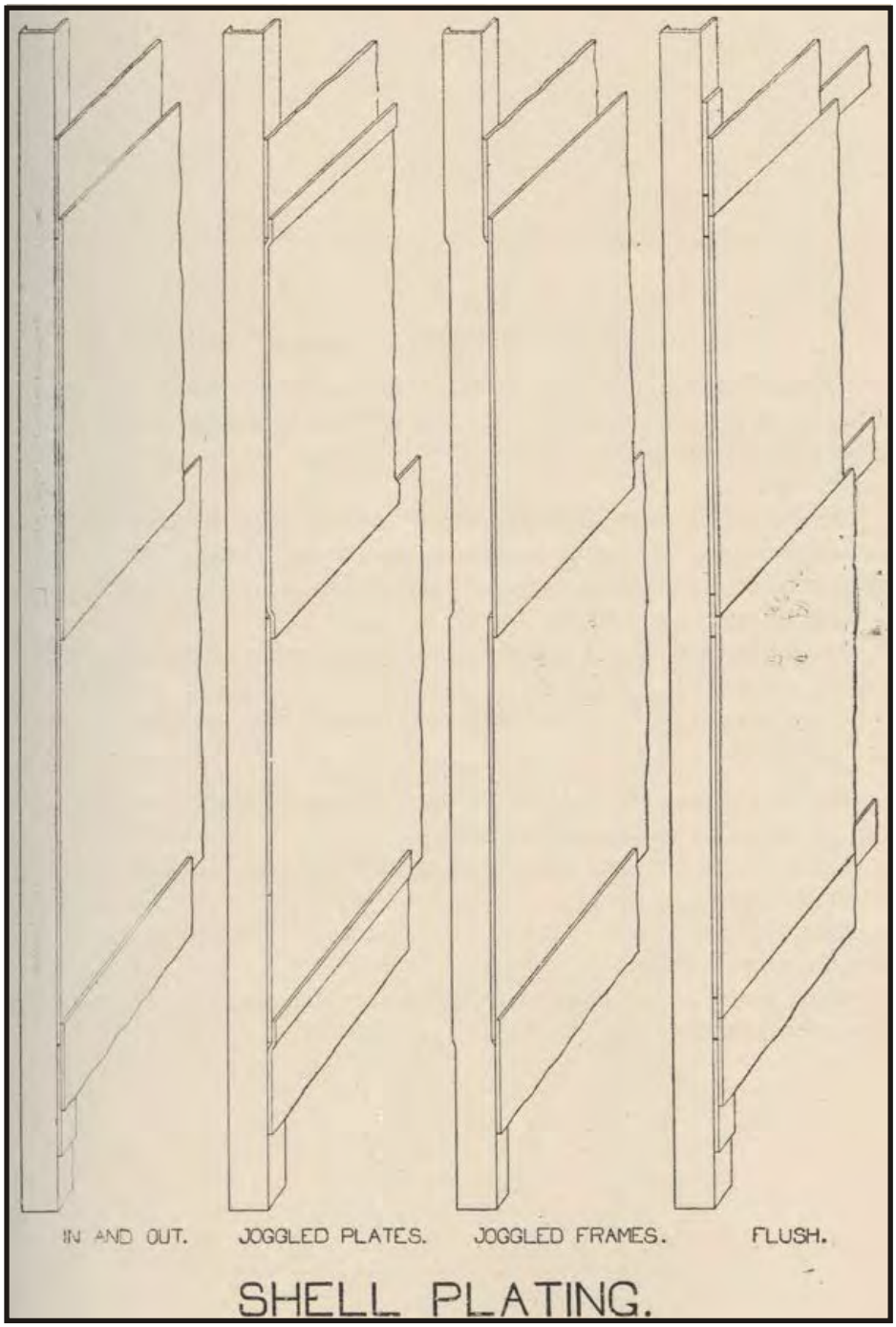


Figure 105: Diagram of shell plating. In-and-out plating gradually gave way to joggled plating. In-and-out plating requires liners to be fitted between the out-strakes and the frames to give a proper connection. (Pursey 1942:82; Drawing H.J. Pursey)

The Lloyds' Survey of 1881 of the *County of Pembroke* states that each plate was six frame spaces long.

Figure 106: Section of side plating. At the upper edge of the plating, note the in-and-out system. (Photo: V. Maitland)

Figure 107: Section of side plating. The in-and-out system of plating can be seen. (Photo: V. Maitland)

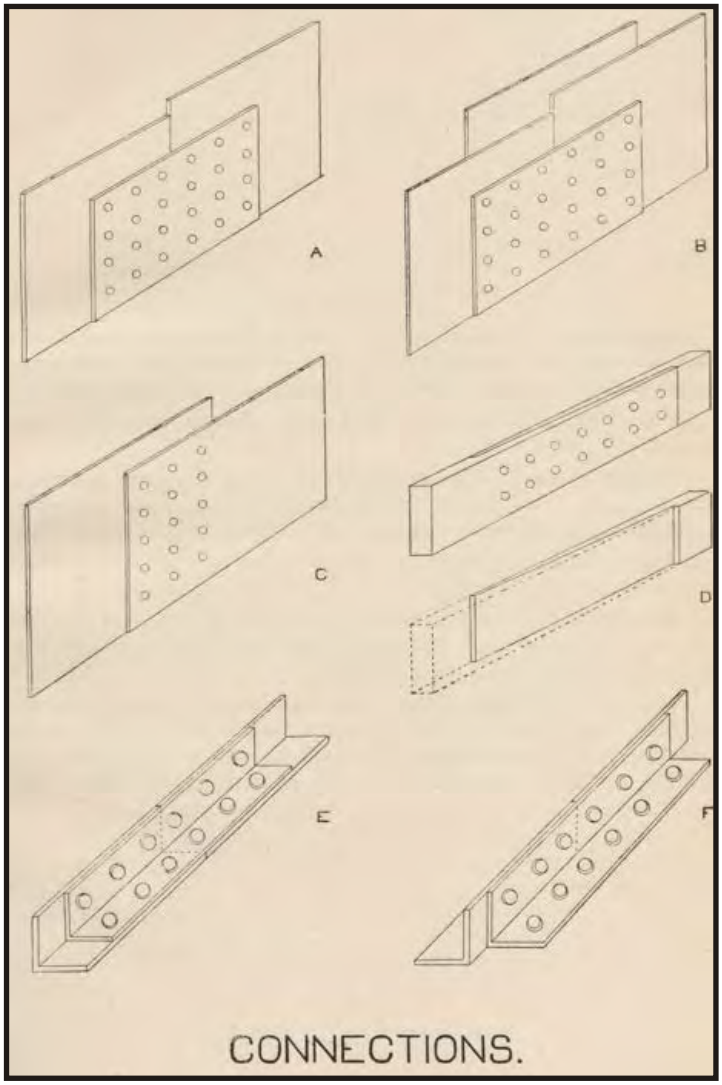


Figure 109: Diagram of connections used in iron hulled vessels. Sketch A is a single strapped joint, it is used for joining the edges of two plates together. It is not very strong, tends to open under stress and is liable to corrosion. This short joining plate is usually known as a butt strap. (Pursey 1942:6; Drawing H.J. Pursey)

Figure 108: Side plating showing the frames and two butt straps. (Photo V. Maitland)

Figure 110: Side view of side plating. The in-and-out system of plating and the butt strap can be seen. (Photo: V. Maitland)

Figure 111: Section of the keel and garboard strake with a butt strap. (Photo V. Maitland)

Figure 112: Section of the keel, garboard strake and keel strake with a butt strap. The joints are staggered to strengthen the hull. (Photo V. Maitland)

Figure 113 - 114: Frames on the side plating. A liner had to be fitted under the frames to ensure a proper connection between the out strakes and frames. (Photo V. Maitland)

Figure 115 - 116: Stacks of removed side plating on the quay side. (Photo V. Maitland)

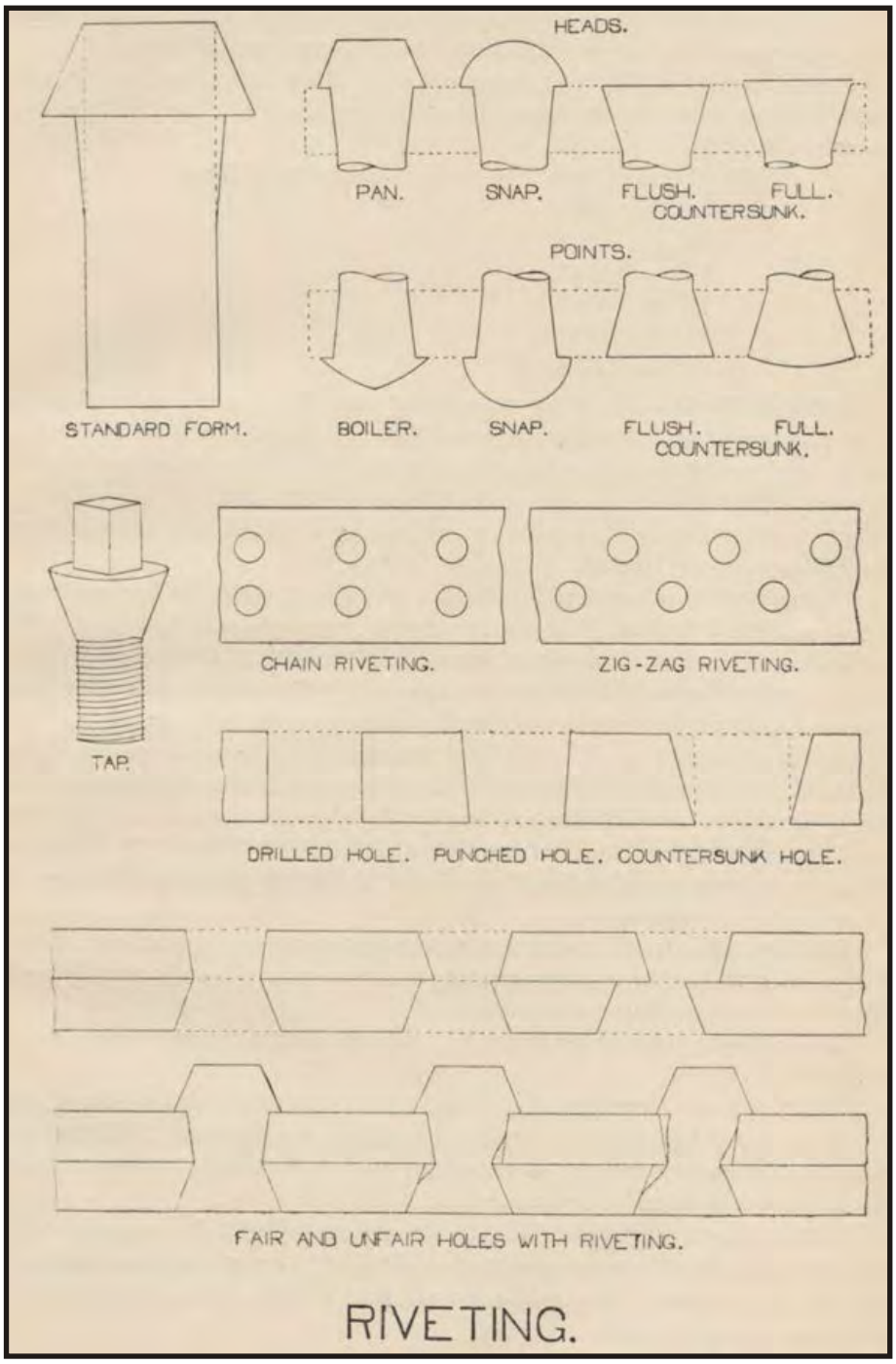


Figure 117: Diagram of riveting. In general, rivets should have the same strength as the parts it connects. The surfaces must be brought as close as possible to each other to close joins efficiently.

Every time a hole is punched in the plate, the plate is weakened, therefore rivets are not placed too closely. Conversely, rivets that are too far apart will not close the join efficiently and stand up to stress.

Where a joint is caulked (e.g. the bar keel) the rivets are not too far from the edge or the caulking could force the join apart.

it's vital that the rivet fits the hole precisely or the joint will be weak. The standard rivet is tapered for part of its length so that it fits tightly into the hole, which is also tapered.

Holes for rivets were either punched or drilled. Punching is the fastest and cheapest method and tapers the hole. This method, however, has a tendency to strain the metal and leave a ragged edge on one side, which has to be removed.

The majority of the rivets on the *County of Pembroke* were pan head rivets. These are used where strength is required; it is the standard form of rivet and usually finished flush. (Pursey 1942:13; Drawing H.J. Pursey)

Figure 118: Top view of pan head rivets. (Photo V. Maitland)

Figure 119: Side view of pan head rivets; the taper of the rivet can be seen. (Photo V. Maitland)

Figure 120: Flush points of pan head rivets, corrosion has bulged it slightly. (Photo V. Maitland)

Figure 121: The point of a pan head rivet; this point is a lot less corroded and is a full point. (Photo V. Maitland)

Figure 122: Four rows of chain riveting on a keel butt strap. (Photo V. Maitland)

Figure 123: Zig-zag riveting on the keel. (Photo V. Maitland)

Figure 124 - 125: The Lloyds' Survey of 1881 states that the inside surfaces of the barque were protected from oxidation by cement and paint. Joints in the keel were usually caulked, this operation had to be carefully done. If the caulking was pushed too far into the joint it could cause it to separate, and if not pushed in enough, would not provide a watertight seal. (Pursey 1942:16) The cement caulking can be seen covering the web frame in Figure 124 and in the join of the bar keel to the garboard strake in Figure 125. (Photos V. Maitland)

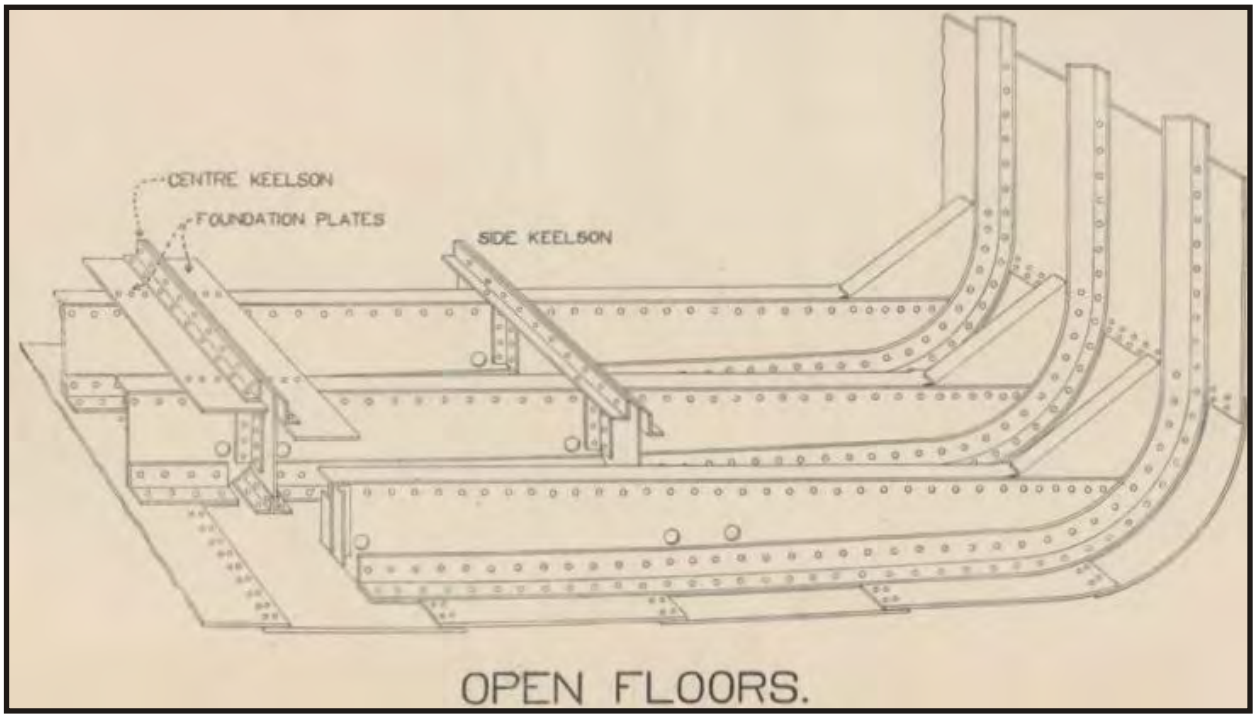


Figure 126: Diagram of open floors. These were originally used in all iron vessels. They were associated with the bar keel and with the frame and reverse, as in the *County of Pembroke*. The original types did not have brackets at the bilge. The keelson, which gives longitudinal strength to the hull, was a built H-beam running fore and aft. The side and bilge keelsons were double angles running for and aft. Later vessels had intercostal plates fitted in conjunction with these double angles. If a vessel was 30 feet wide, it needed one side keelson on each side of the centre keelson. (Pursey 1942:38; Drawing H.J. Pursey)

Figure 127: Keel, floor frames and centre keelson. (Photo V. Maitland)

Figure 128: Side view of floor frames. (Photo V. Maitland)

Figure 129: Close-up of floor web frames, they are angled towards the bilges. (Photo V. Maitland)

Figure 130: The floor web frames are much wider midships and get narrower towards the bow and stern. This section is probably from the midship area. (Photo V. Maitland

Figure 131: There are no brackets in the bilge in keeping with earlier iron vessel designs. There is a bilge keelson, on the floor head, visible in the Doxford drawing (Figure 95). (Photo V. Maitland)

Figure 132: This view of the bilge shows the frames. The frames change from web frames on the floor to frame and reverse frames on the bilge and sides. (Photo V. Maitland)

Figure 133: Turn of the bilge and floor head. (Photo V. Maitland)

Figure 134: Manufacturer's stamp on the web framing. All that can be seen is OCKTON M IC[o]. The Lloyds' Survey states the iron comes from the West Stockton Iron Co, Stockton. (Photo V. Maitland)

Keelsons

Figure 135: The *County of Pembroke* had a bar keel. The keelson is a built H-beam, running fore and aft, it has a rider plate above it. There are four side keelsons, two per side. There are two bilge keelsons, these are the precursors to brackets and add strength. (Photo V. Maitland)

Figure 136: Detached section of the centre keelson. The structure of the built H-beam and rider plate are visible. (Photo V. Maitland)

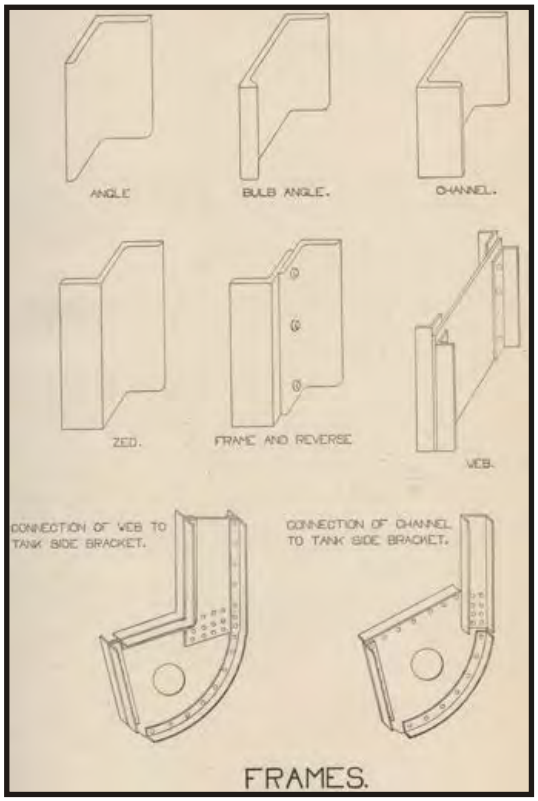


Figure 137: Diagram of frames. Angle frames were used in early iron ship building. Frames give transverse strength to the hull. However, angle frames were not strong enough, so a reverse angle was riveted to the inner flange. This system of construction also required one or more side stringers to strengthen the structure. After bulb angles and channel bars were introduced the frame and reverse system virtually disappeared. Additional stiffening was provided by web frames. (Pursey 1942: 50-51; Drawing H.J. Pursey)

Figure 138 - 139: Note web frames and side keelson. Under the side keelsons there are strengthening intercostal plates. (Photo V. Maitland)

Side Frames and Stringers

Figure 140 - 141: Seen from the top of the side plating looking down along the frames. The frame and reverse system can be seen. Intercostal plates under certain stringers are also visible. (Photo V. Maitland)

Figure 142: Side stringers add longitudinal strength to the hull. (Photo V. Maitland)

Figure 143: The side plating with frames, side stringers and 'tween deck. (Photo V. Maitland)

Beam Knees and Beams

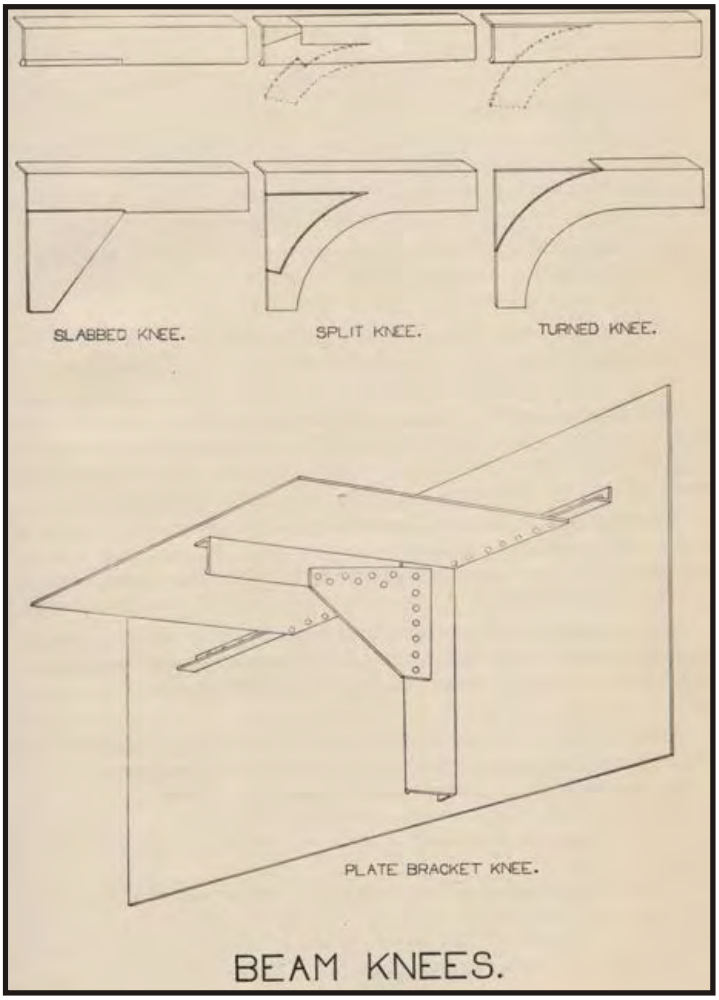


Figure 145: Diagram of beam knees. The slabbed, split and turned knee were obsolete by 1942. With these types, the beam is cut and the plate welded in. (Pursey 1942:56; Drawing H.J. Pursey)

Figure 144: Side plating showing frames, side stringers and beam knees of the 'tween deck. (Photo V. Maitland)

Figure 146: Beam knee, a turned knee with a bulb. (Photo V. Maitland)

Figure 147: Close-up of the beam knee. It is still attached to the side frame. Rivet holes are visible on the upper edge where it was attached to the 'tween deck beams. (Photo V. Maitland)

Figure 148: Section of side plating with the plate bracket knee that supported the main deck. (Photo V. Maitland)

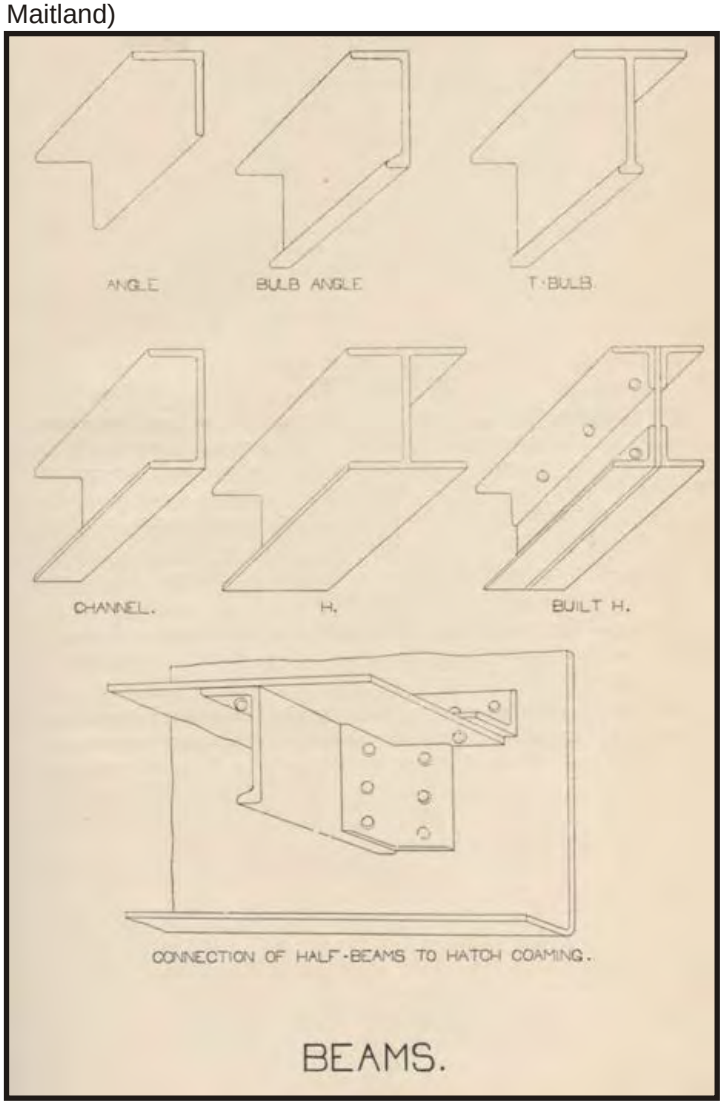


Figure 150: Diagram of beams. Beams have two purposes, to tie the sides of the ship together and to support the deck against water pressure and the weight of cargo. Angle, bulb-angles and channels were in general use, T-sections were used under wood decks. H-beams were used for strong beams, such as the keelson in the *County of Pembroke*. Beams must be fitted at every frame space. (Pursey 1942:53-4; Drawing H.J. Pursey)

Figure 149: Built H-beam. These were used where strong support was required. (Photo V. Maitland)

Figure 151: This square beam was recovered in 2004. It had two round holes in the side and is flanged on the end. (Photo V. Maitland)

Figure 152: Most vessels have permanent dunnage or a ceiling covering the open floor, it creates space to dry up moisture. (Brown 1931:391; Photo V. Maitland)

Figure 153: Ceiling next to the side keelson. (Photo V. Maitland)

Figure 154: Hold ceiling with markings. (Photo V. Maitland)

Figure 155: Close-up of the Roman numeral II on the hold ceiling. (Photo V. Maitland)

Figure 15: Top view of wooden dowel. The ceiling on the keel floor was attached with wooden dowels. (Photo V. Maitland)

Figure 157: Bottom view of wooden dowel. (Photo V. Maitland)

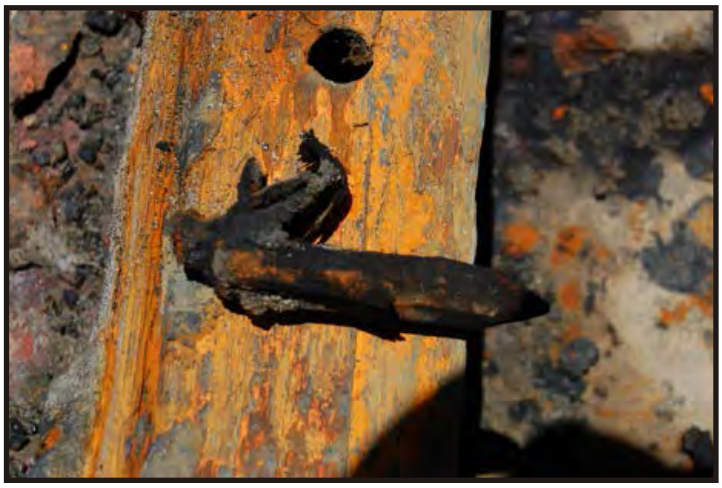


Figure 158: An extracted wooden dowel. (Photo V. Maitland)

Figure 159: In-situ view of the hold ceiling. (Photo V. Maitland)

Figure 160: In-situ view of the hold markings in the fore section of the barque. Roman numerals DII. (Photo V. Maitland)

Figure 161: Hold markings, on recovered ceiling. Roman numerals DII. (Photo V. Maitland)

Figure 162: Dunnage, Roman numerals XVII. (Photo V. Maitland)

Figure 163: Dunnage, Roman numerals XXX and VIII. (Photo V. Maitland)

Figure 164: Dunnage, Roman numerals CI and upside down V. (Photo V. Maitland)

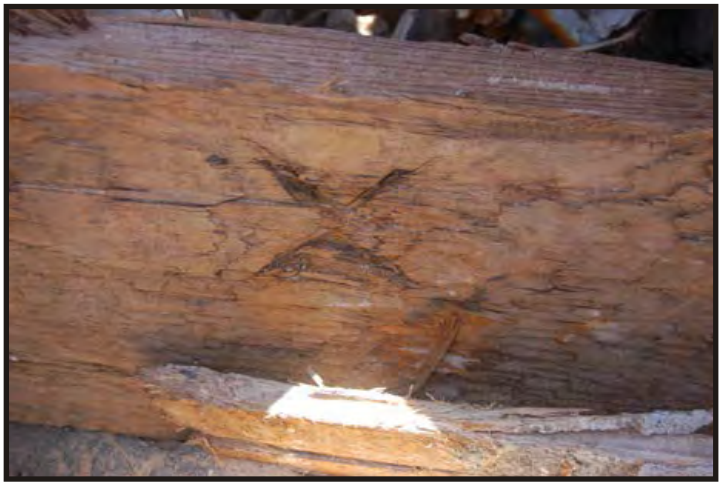


Figure 165: Dunnage, Roman numeral X. (Photo V. Maitland)

Figure 166: Dunnage, Roman numerals XIII. (Photo V. Maitland)

Figure 167: Dunnage, Roman numerals XV. (Photo V. Maitland)

Figure 168: Turn of the bilge, showing the ceiling. (Photo V. Maitland)

Figure 169: Cleats on side frames. These hold the side battens, which are part of the hold ceiling. This permanent dunnage is sufficient for rough cargoes and other goods not liable to absorb moisture. (Brown 1931:391; Photo V. Maitland)

Figure 170: Side battens fixed in cleats. (Photo V. Maitland)

Figure 171: Additional dunnage was laid where water was likely to collect, including on stringers and stringer plates. Condensation would trickle down the plating and frames and lodge on the stringers (Brown 1931:391). Marked from left to right with Roman numerals, VI and VII. (Photo V. Maitland)

Figure 172: Side plates and frames. Shaped blocks of wood were wedged between the frames, they may have served the dual purpose of absorbing moisture and acting as intercostal support. (Photo V. Maitland)

Figure 173: Intercostal block, shaped to fit between the frames. (Photo V. Maitland)

Figure 174: Intercostal block, shaped to fit between the frames. (Photo V. Maitland)

Figure 175: Intercostal block with Roman numerals VII. (Photo V. Maitland)

Hold Pillars

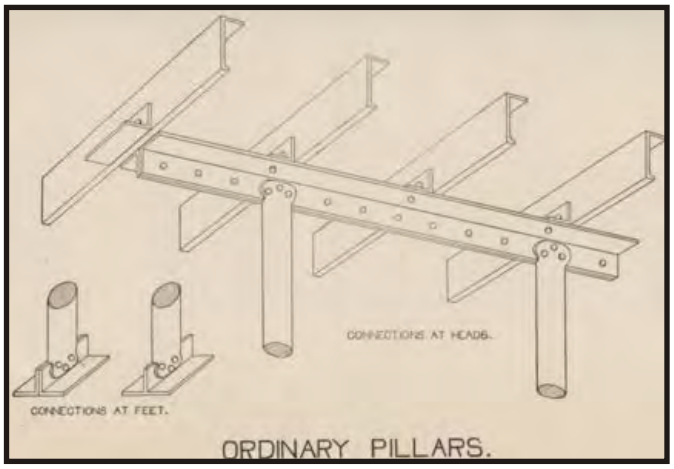


Figure 176: Diagram of pillars. Pillars support the deck above them and tie the beams to the hull. The use of pillars led to a reduction of beam size by shortening the length of the unsupported beam. Originally, all vessels had one row of ordinary pillars fitted at the centre line. Figure 95 shows that there was one centre line of pillars in the *County of Pembroke*; one in the lower deck and another in the 'tween deck. (Pursey 1942:66; Brown 1931:451; Drawing H.J. Pursey)

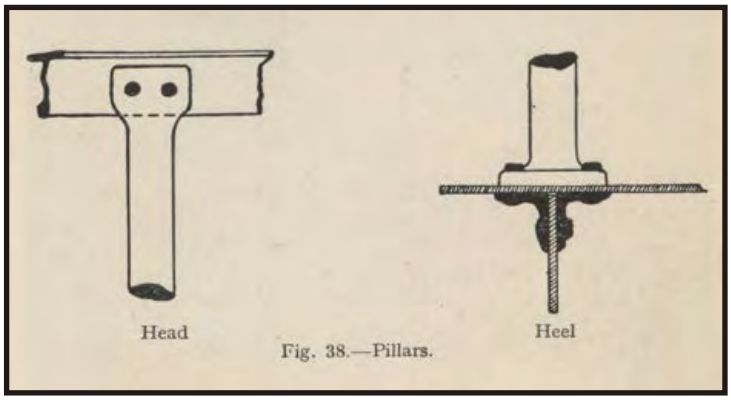


Figure 177: The *County of Pembroke's* pillars were constructed of solid, round, iron bars. The heel was riveted to the bottom rider plate. (Drawing in Brown 1931:433)

Figure 178: Pillar attached to the deck beam. (Photo V. Maitland)

Figure 179: Pillar. The end is not pointed as it appears, it's sheared off. (Photo V. Maitland)

Figure 180: Head of a pillar, where it was riveted to the deck beam. (Photo V. Maitland)

Figure 181: End of a pillar, that seems to have a sleeve attached. (Photo V. Maitland)

Figure 182: Pillars at the dump site. (Photo V. Maitland)

Figure 183: Heel of pillar, it is a T-section riveted to the beam or centre keelson. (Photo V. Maitland)

Figure 184: Heel attached to rider plate of the centre keelson. (Photo V. Maitland)

Figure 185: Heel, showing bottom of rivets. (Photo V. Maitland)

Hold Hatchways

According to Bisset (1958: 194), the hold had a main hatch with a fore part and an iron ladder leading into the hold. “Opening the fore part of the main hatch, all hands and the cook, with hurricane lamps and candles, clambered down the iron ladder, into the hold.”

The Lloyds' Survey states that the *County of Pembroke* had three cargo hatchways, the main hatchway was 15' 4" x 10' and the fore and quarter hatches were both 7' 8" x 6'. There was portable ladder on the main hatch.

Figure 186: 7-rung section of ladder. (Photo V. Maitland)

Figure 187: 4-rung section of ladder. (Photo V. Maitland)

Hawsepipes

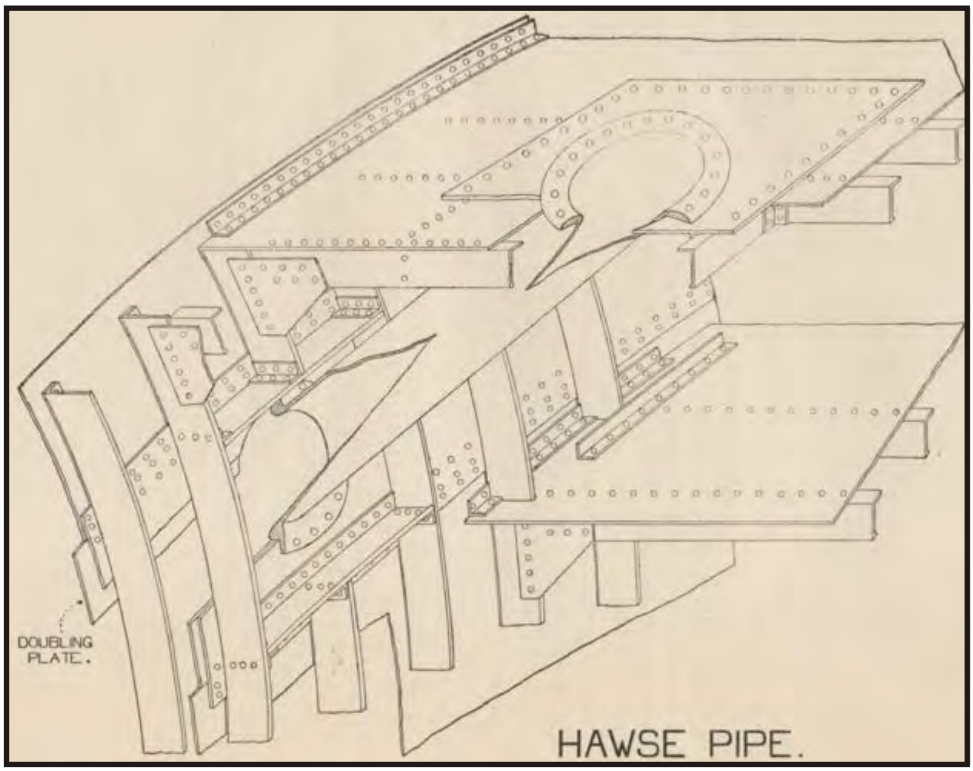


Figure 188: Diagram of hawsepipes. They were originally made from either cast iron or steel. They were difficult to construct from drawings therefore a wooden model was made in the ship and the hawsepipe was cast from this. There were two ways in which the hawsepipe could be fitted to the vessel. Firstly, the lower end was riveted to the side plating and the upper end was riveted to the deck. Secondly, the lower end was riveted to the side plating and the upper end pierced the deck and a heavy iron slab was bolted over it. (Pursey 1942:142; Drawing H.J. Pursey) In the *County of Pembroke*, the first method was used.

Figure 189: Side view of the lower end of the hawsepipe as it passed through the side plating. (Photo V. Maitland)

Figure 190: Top view of lower end of hawsepipe as it passed through side plating. There are four rivets attaching it to the plate. (Photo V. Maitland)

Figure 191: Side view of lower end of hawsepipe on the inner surface of the side plating. (Photo V. Maitland)

Figure 192: Close-up of lower end of hawsepipe on the inner surface of side plating. The rivet is visible. (Photo V. Maitland)

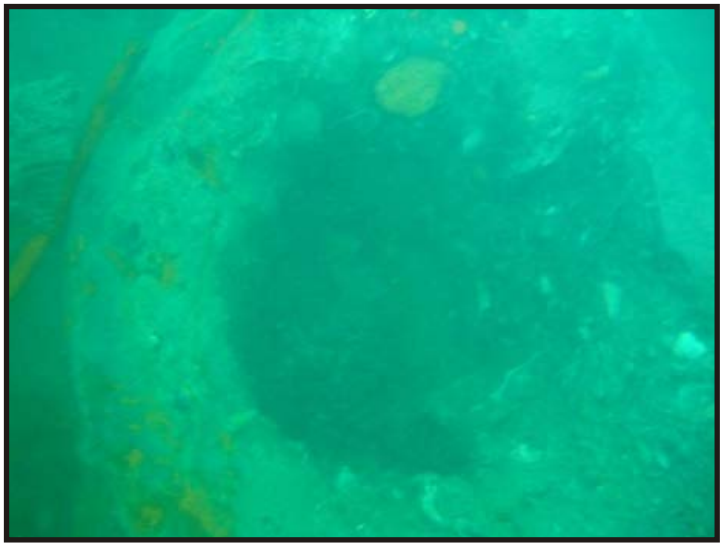


Figure 193: In-situ photograph of the upper end of the hawsepipe. (Photo Subtech)

Figure 194: Top view of upper end of hawsepipe, this was riveted to the deck. (Photo V. Maitland)

Figure 195: bottom of the upper hawsepipe. A section of the deck planking is visible. (Photo V. Maitland)

Figure 196: Bottom of starboard bow hawsepipes. Most vessels had three hawsepipes on the bow, one on the port and two on the starboard side. One on each side is for the bower anchors, the second one on the starboard side is for the sheet anchor (Blackburn 1981:157; Photo V. Maitland)

Portholes

Figure 197: Stern porthole. After studying the high resolution picture of the *County of Pembroke*, I can discern three or more portholes on the upper section of the stern. (Photo V. Maitland)

Figure 198: Close-up of inner side of the porthole. The correct terms for a porthole are deadlight or scuttle. (Blackburn 1981:243; Photo V. Maitland)

Figure 199: Close-up of a stern porthole. It still has the frame riveted to the plating. (Photo V. Maitland)

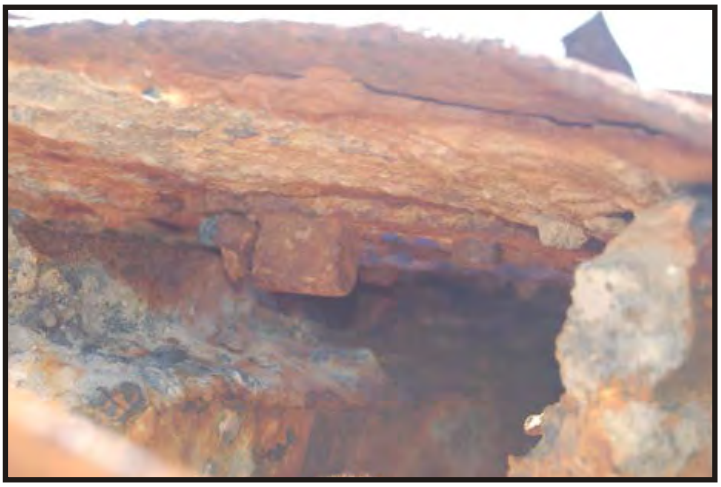


Figure 200: Close-up of the stern porthole hinge. (Photo V. Maitland)

Figure 201: Front of a complete porthole recovered during operations in 2004. (Photo V. Maitland)

Figure 202: Back of the porthole. (Photo V. Maitland)

Decks

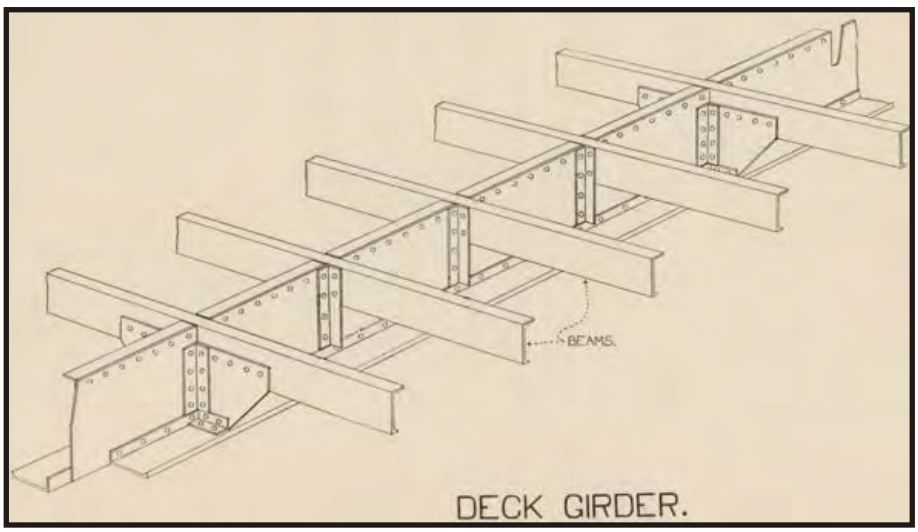


Figure 203: Diagram of deck girders. They were usually double angles or double channels (Pursey 1942:72). According to Lloyds' Survey of 1881, the *County of Pembroke's* 'tween deck beams were half an inch thicker than the upper deck beams. There were four pairs of diagonal tie plates under the transverse beams and upper deck tie plates on the edges of the girder. These all strengthened the deck girders. (Drawing H.J. Pursey)

Figure 204 - 205: Two different views of the underneath of part of a deck girder. (Photo V. Maitland)

Figure 206: Part of a deck girder. (Photo V. Maitland)

Figure 207: Close-up of the diagonal tie plates. (Photo V. Maitland)

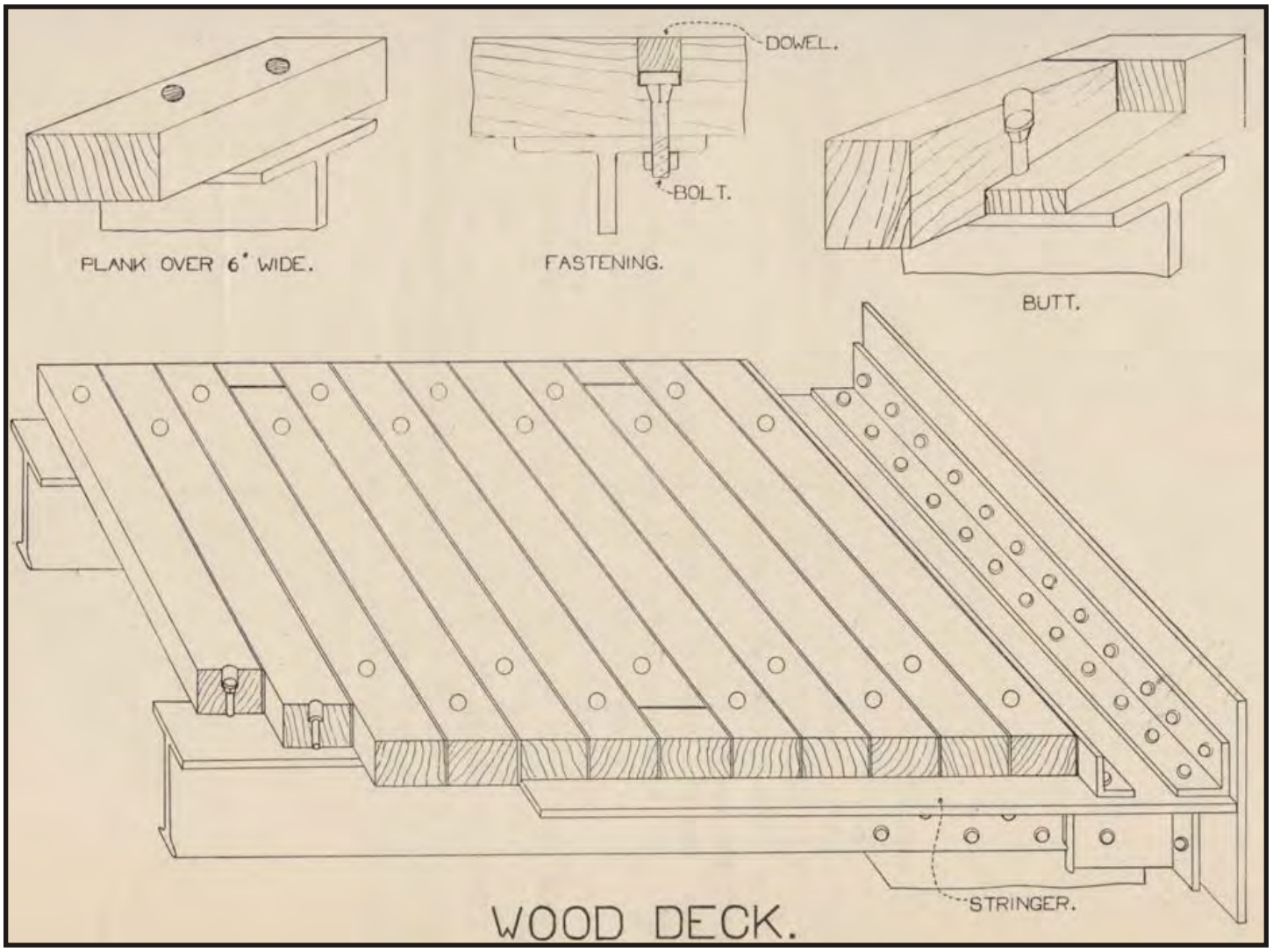


Figure 208: Diagram of a wood deck. This type of wood deck was phased out because it lacked strength. However, when it was used, there had to be strengthening tie plates. Pine planking was 2½ inches thick. Each plank was fastened at every beam with bolts. The bolts were sunk, with oakum and white lead under their heads. Turned dowels were fitted in the holes and bedded in marine glue or some other similar substance. (Pursey 1942:60; Drawing H.J. Pursey)

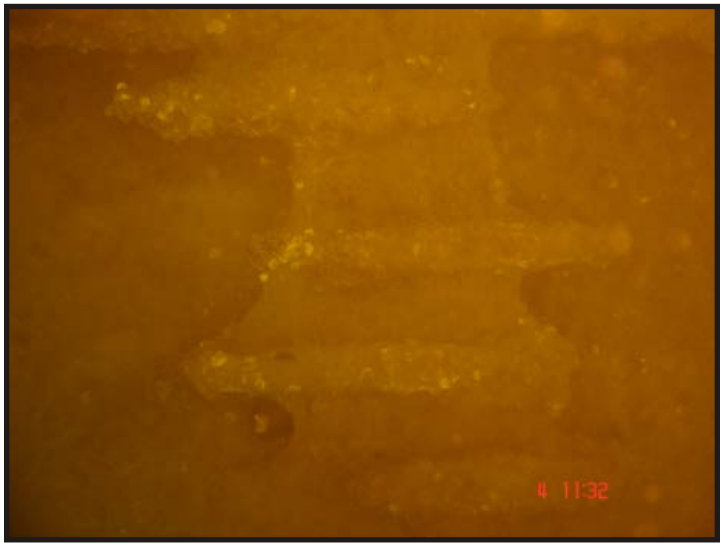


Figure 209: In-situ decks. (Photo Subtech)

Figure 210: Upper wooden decking. According to Lloyds' Survey of 1881 it was yellow pine and the 'tween deck was Baltic white pine. The decking that was retrieved from the wreck was badly preserved. It had been attacked by various marine organisms. (Photo V. Maitland)

Figure 211: Close-up of the deck. The wooden dowels are visible. According to Bisset (1958:67) when the ship was stuck in the doldrums, the pitch in the deck seams softened and the crew had to haul up buckets of sea water to douse the decks. (Photo V. Maitland)

Figure 212: Side view of deck beams with the wooden deck attached. (Photo V. Maitland)

Figure 213: Close-up of beams and deck. Bolts for attaching the deck to the beam are visible. (Photo V. Maitland)

Figure 214: Close-up of beams and deck. Bolts for attaching the deck to the beam are visible. (Photo V. Maitland)

Figure 215: Pile of deck planking. (Photo V. Maitland)

Figure 216: Bottom of a deck plank. Corrosion from the beams is visible. (Photo V. Maitland)

Figure 217: Deck plank. This is different from the other planks, it has several rows of three holes each for fasteners; it could be from a different part of the barque or from another wreck. It is possible that when the wreck was removed from North End Beach, the salvors loaded parts of other wrecks onto the *County of Pembroke* to clean up the problems that wrecks were causing. (Photo V. Maitland)

Figure 218: Close-up of the plank with the rows of three holes for fasteners. (Photo V. Maitland)

Bulwarks

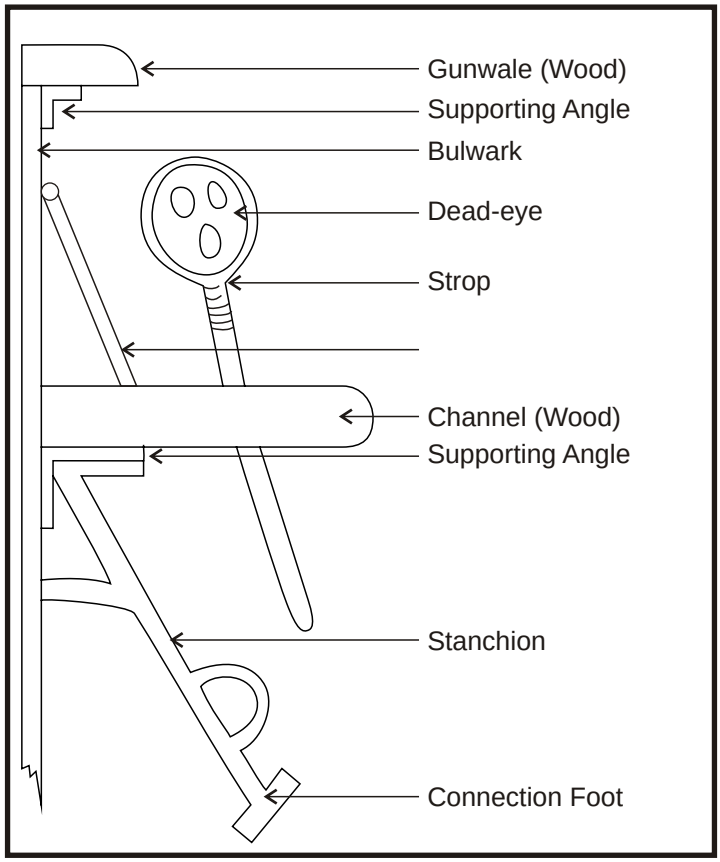


Figure 220: Diagram of the *County of Pembroke's* bulwark. According to the Lloyds' Survey of 1881, the gunwale plate was attached to the beams of the upper deck. There were mooring pipes, five washports and five scuppers on each side. (Drawing V. Maitland)

Figure 219: Long section of the bulwark removed in 2004. The supporting angle of the gunwale is towards us. (Photo V. Maitland)

Figure 221: Photo of the bulwarks showing the features in Figure 220. (Bisset 1958:49)

Figure 222: Bulwark, seen from bottom. Note gunwale at the back. (Photo V. Maitland)

Figure 223: Gunwale, from the top and side. (Photo V. Maitland)

Figure 224: Top of gunwale and dowel covering the bolt, which attaches the gunwale to the supporting angle of the bulwark. Where knots occurred, they were removed and plugged.(Photo V. Maitland)

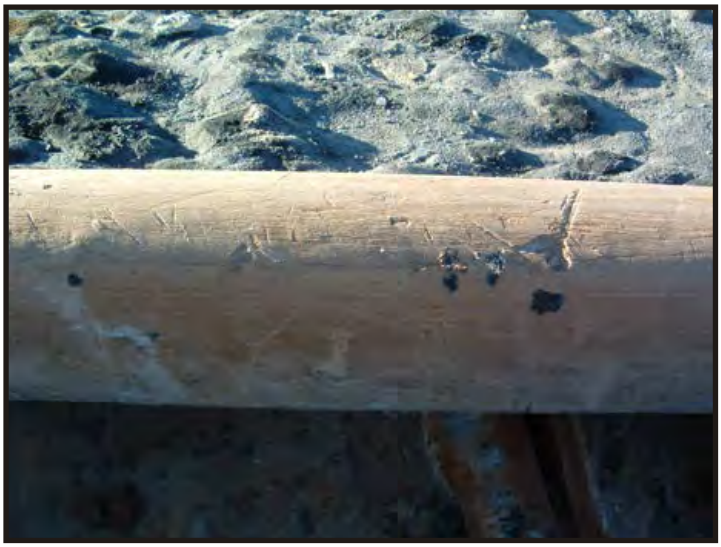


Figure 225: Close-up of the gunwale, nicks and scratches from shipboard work visible. (Photo V. Maitland)

Figure 226: Top of gunwale and dowel covering the bolt. (Photo V. Maitland)

Figure 227: Top of gunwale. Repairs were made to the wood and covered with a copper sheet. (Photo V. Maitland)

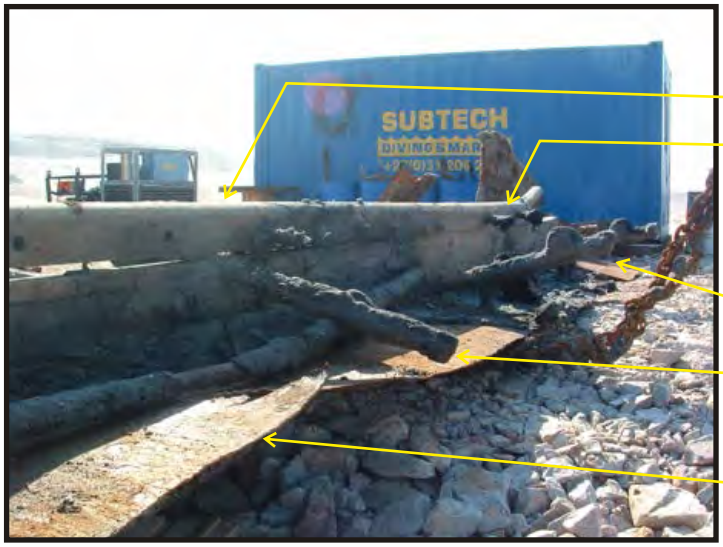


Figure 228: The channel projects from the sides of the ship and is used to give a greater spread to the lower rigging and backstays; this changed in later vessels to chain plate (Underhill 1938:108). In the *County of Pembroke*, the channel was on the inside of the bulwark. View of the channel from below, stanchions are visible, as well as the bottom of a dead-eye. On the far right of the channel are two metal projections, these go straight through the wood. There were various bitts throughout sailing vessels for tying down rigging. (Photo V. Maitland)

Figure 229: Top of channel showing a dead eye and the supporting angle for the gunwale. (Photo V. Maitland)

Figure 230: Channel showing a stanchion and dead-eye. Cordage is tangled around the dead-eye. (Photo V. Maitland)

Figure 231: Close-up of dead-eye in the channel. (Photo V. Maitland)

Figure 232: Side view of bulwark. (Photo V. Maitland)

Figure 233: Bottom of channel. Note the connection of the stanchion to the bottom of the channel. (Photo V. Maitland)

Figure 234: Bulwark. Where there are no channels the stanchion is different, it's a solid bracket. (Photo V. Maitland)

Figure 235: Scupper on the bulwark under the channel. (Photo V. Maitland)

Figure 236: Chain plates. Dead-eyes were connected directly to the bulwark. Even though chain plates eventually replaced channels, the *County of Pembroke* had both systems. (Photo V. Maitland)

Figure 237: Close-up of the dead-eye attached to the chain plate. (Photo V. Maitland)

Figure 238: Close-up of chain plate where it's riveted to the bulwark. (Photo V. Maitland)

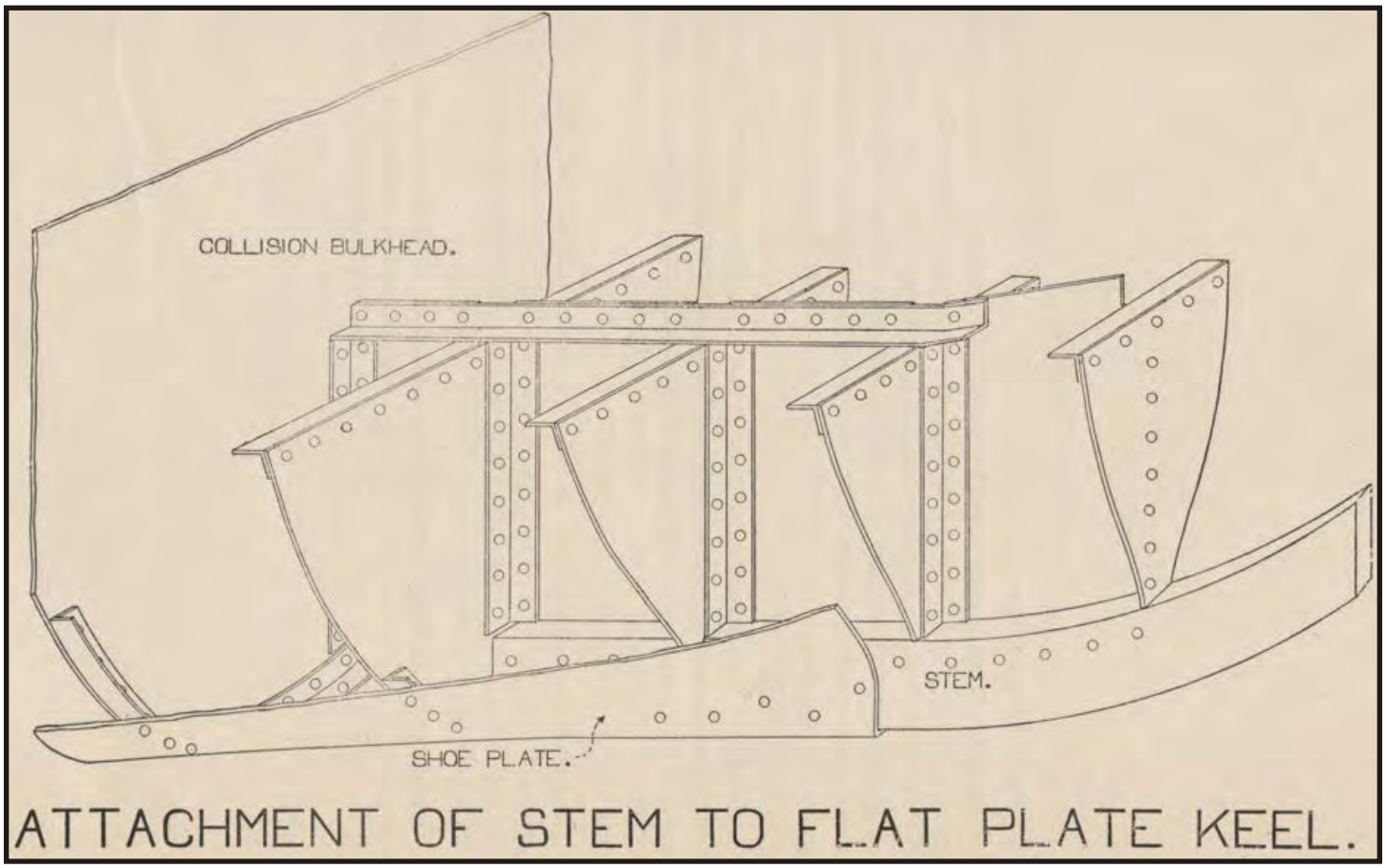


Figure 239: Diagram of a bow. Although this diagram is of a flat plate keel it still gives a clear cut-away of the bow structure. In a ship with a bar keel, like the *County of Pembroke*, the stem is scarphed to and forms a continuation of the bar keel. (Pursey 1942:106; Drawing H.J. Pursey)

Figure 240: Bottom of the bow of the *County of Pembroke*. (Photo V. Maitland)

Figure 241: Cross-section view of the bow. (Photo V. Maitland)

Figure 242: Close-up of bar keel / stem. (Photo V. Maitland)

Figure 243: Fore-peak, the narrow part of the vessel's hold close to the bow and under the lowest deck; often only accessible from the general store room (Ward 1891:5). According the Lloyds' Survey of 1881, the *County of Pembroke* had six breast hooks and five crutches. (Photo V. Maitland)

Figure 244: Cose-up of the fore-peak and breast plate. (Photo V. Maitland)

Figure 245: Close-up of the keelson looking into the fore-peak. (Photo V. Maitland)

Figure 246: Upper section of the bow where the outline of the vessel's name was found. (Photo V. Maitland)

Figure 247: Cutwater. (Photo V. Maitland)

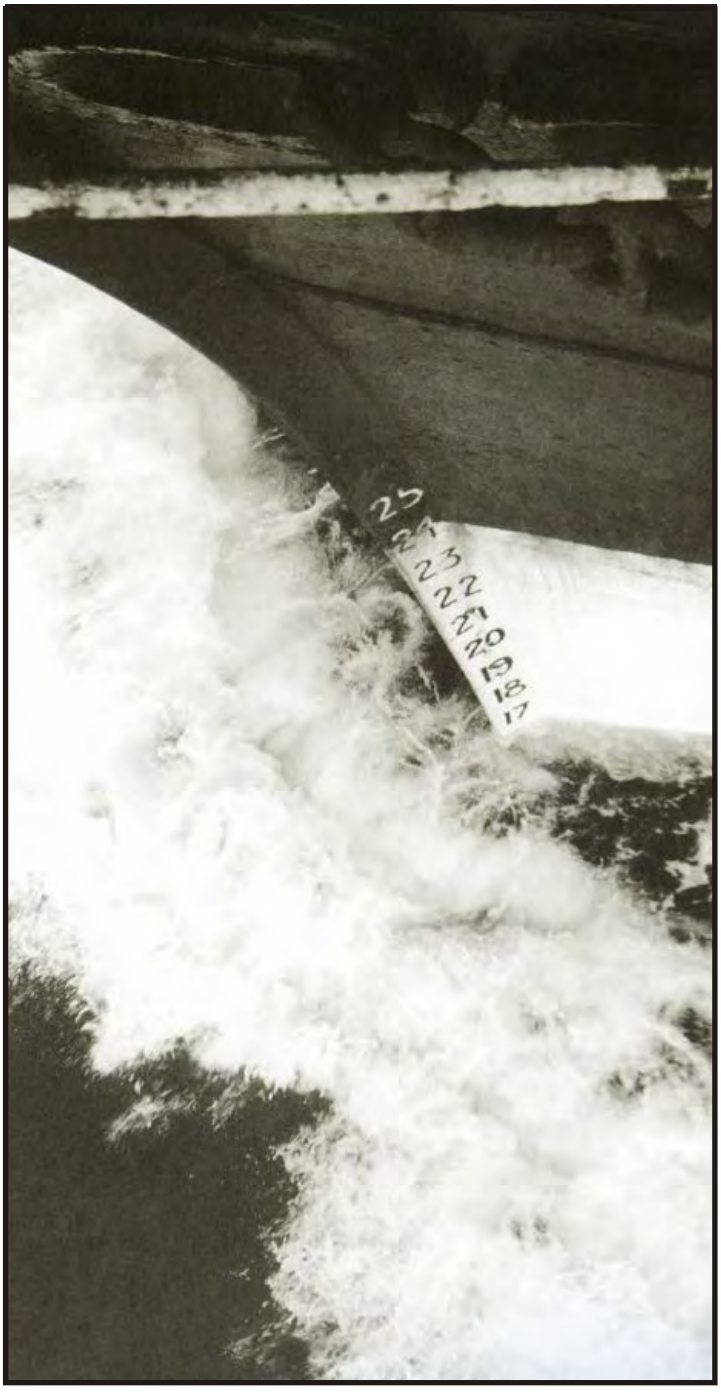


Figure 248: Cutwater of the *Lawhill*, a 4-masted steel barque built in 1892. (Spencer 1997:84; Photo G.Belton)

Figure 249: Bow and rubbing strake. This strake was riveted along the length of the hull to absorb any impact and prevent the hull from being scratched or damaged. (Blackburn 1981:266; Photo V. Maitland)

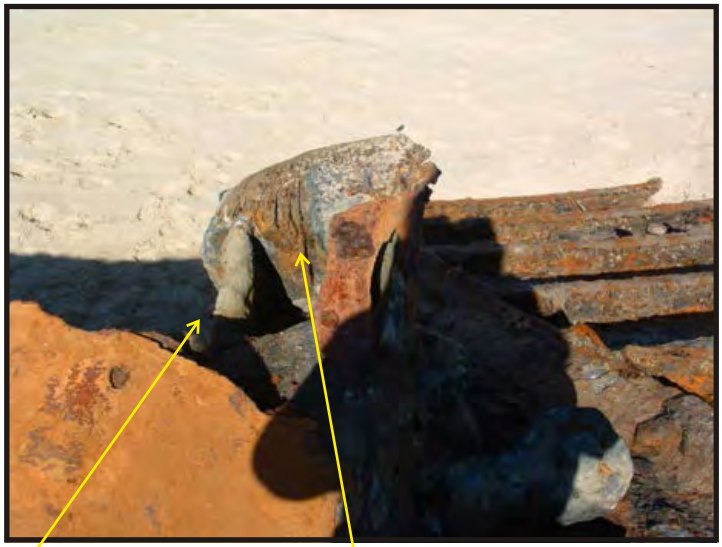


Figure 250 Wood and brass bolt. Situated at the end of the stem, it may be gammoning, the lashing by which the bowsprit was secured to the stem; or a saddle, a semi-circular piece of wood, shaped and fastened to the upper side of the bowsprit.(Luce 1891:110; Steel 1794:8; Photo V. Maitland)

Figure 251: Close-up of the letter 'P'. (Photo V. Maitland)

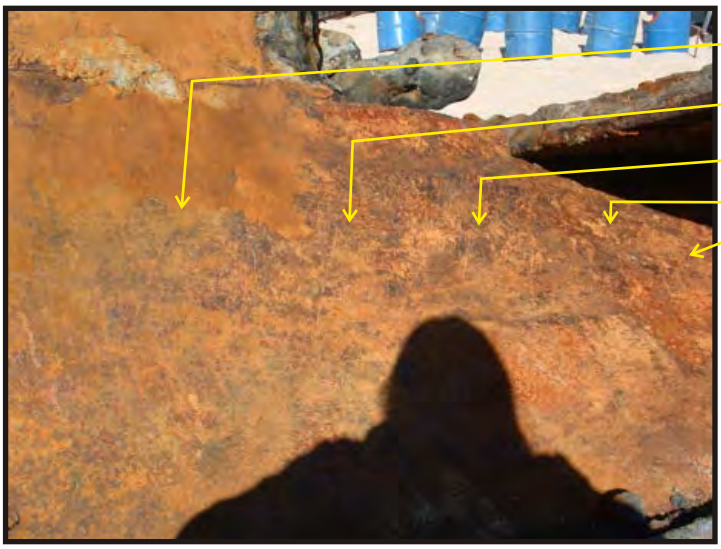


Figure 252: Outline of the barque's name. This section was buried under sand, lying with its outer side in conglomerate. The brass letters which may have left the imprint were never found. The outlines of the letters were visible on this section, allowing identification of the wreck. (Photo V. Maitland)

Figure 253: Underneath view of the bow plating where the ship's name was found. Knight-heads were strong uprights on each side of the upper part of the stem to strengthen the bow and support the bowsprit. (Luce 1891:110; Photo V. Maitland)

Figure 254: Side view of the bow section. The hawseholes were just above the 'tween deck. (V. Maitland)

Figure 255: Close-up of hawseholes. Unlike the previous hawsehole,s the upper side is a solid cast slab with two pipes. There is a separating plank of wood between the bow plates and the upper end of the hawse pipe. (Photo V. Maitland)

Figure 256: Section of side plating showing the rider plates where the vessel starts to narrow towards the bow. (Photo V. Maitland)

Figure 257: Large piece of wood with brass bolts recovered in 2004. It was found in the bow area. It may be the wood the figurehead was attached to.

The figurehead is a carved ornament attached under the bowsprit. Some of the oldest boats discovered had figureheads ranging from animals to likenesses of gods. Towards the end of the sailing ship era, the favoured figurehead was a half-clad female. Superstitious sailors thought that a woman on board was bad luck, but it was thought that a naked female would calm an angry sea. (Blackburn 1981:125) The *County of Pembroke's* figurehead was a half-clad woman. (Photo V. Maitland)

Figure 258: Close-up of the brass bolt. (Photo V. Maitland)

Figure 259: Close-up of a wooden dowel. (Photo V. Maitland)

Stern

Figure 260: Stern. Gudgeons are on the rudder post and pintles fitted into the gudgeons. According to the Lloyds' Surveyof 1881, the stern post is the same dimensions as the keel and stem. Unfortunately the keel was not attached to the stern.

Figure 261: Stern section of the *County of Pembroke*. (Photo V. Maitland)

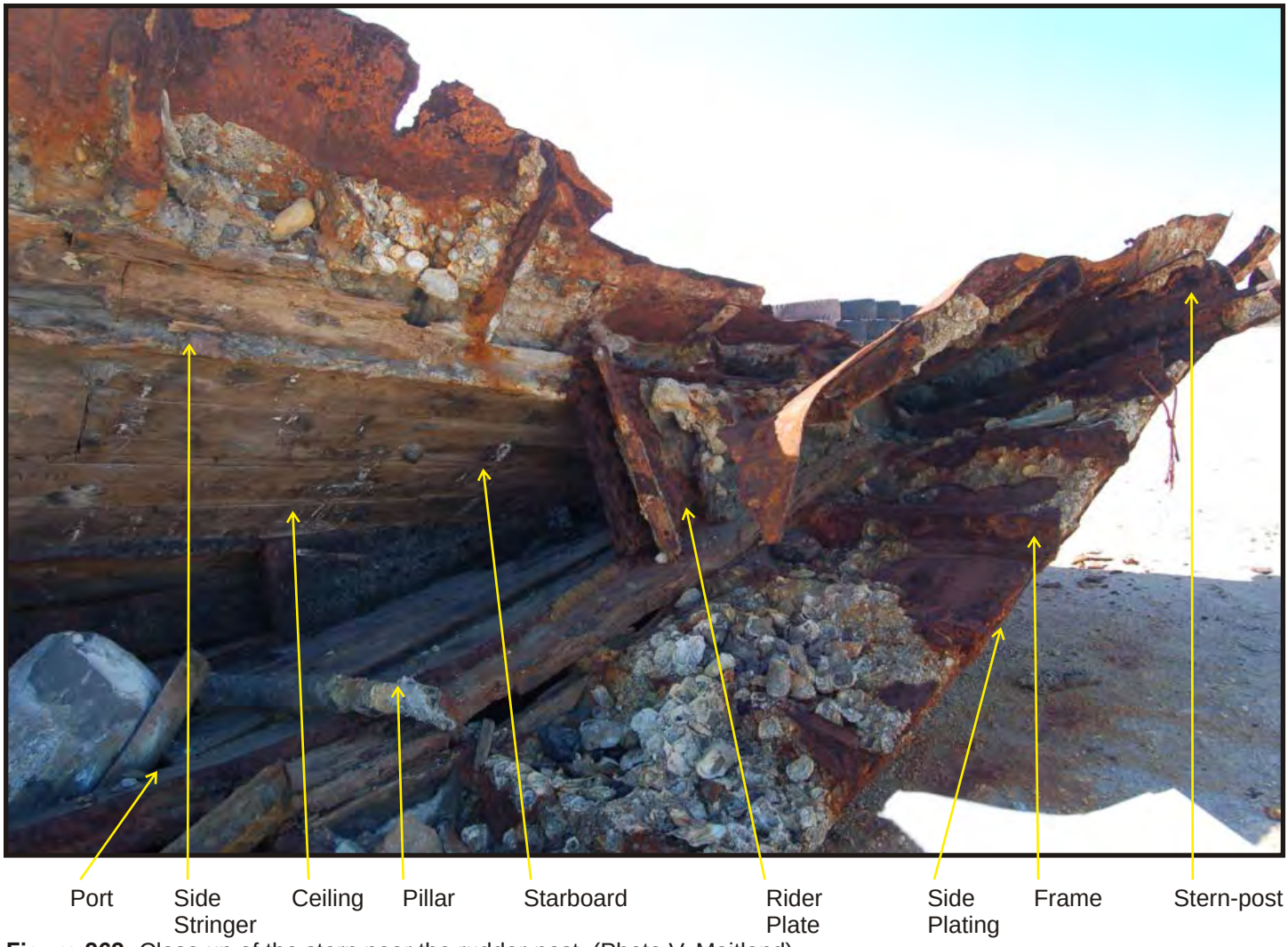


Figure 262: Close up of the stern near the rudder-post, (Photo V. Maitland)

Figure 263: Cross-section of the stern. (Photo V. Maitland)

Figure 264: Close-up of the keel section of the stern. The keel is gone, the keelson is still visible. (Photo V. Maitland)

Figure 265: A close-up of the missing keel. This may be the part that was damaged during the wrecking of the barque in 1903. The Eastern Province Herald (24-03-1904) mentions that 17 feet of her keel was ripped away, presumably when she grounded on the limestone rock. (Photo V. Maitland)

Figure 266: Close-up from the side towards the rudder-post. The keelson can be seen running under the two rider plates. (Photo V. Maitland)

Figure 267: Close-up of the rider plate and angle iron on either side. (Photo V. Maitland)

Figure 268: Top view of rider plate, which is a continuation of the side stringer and keelson. (Photo V. Maitland)

Figure 269: Close-up of rudder-post area and top of the lower rider plate. The coal was part of the cargo. The wood may have been temporary dunnage. (Photo V. Maitland)

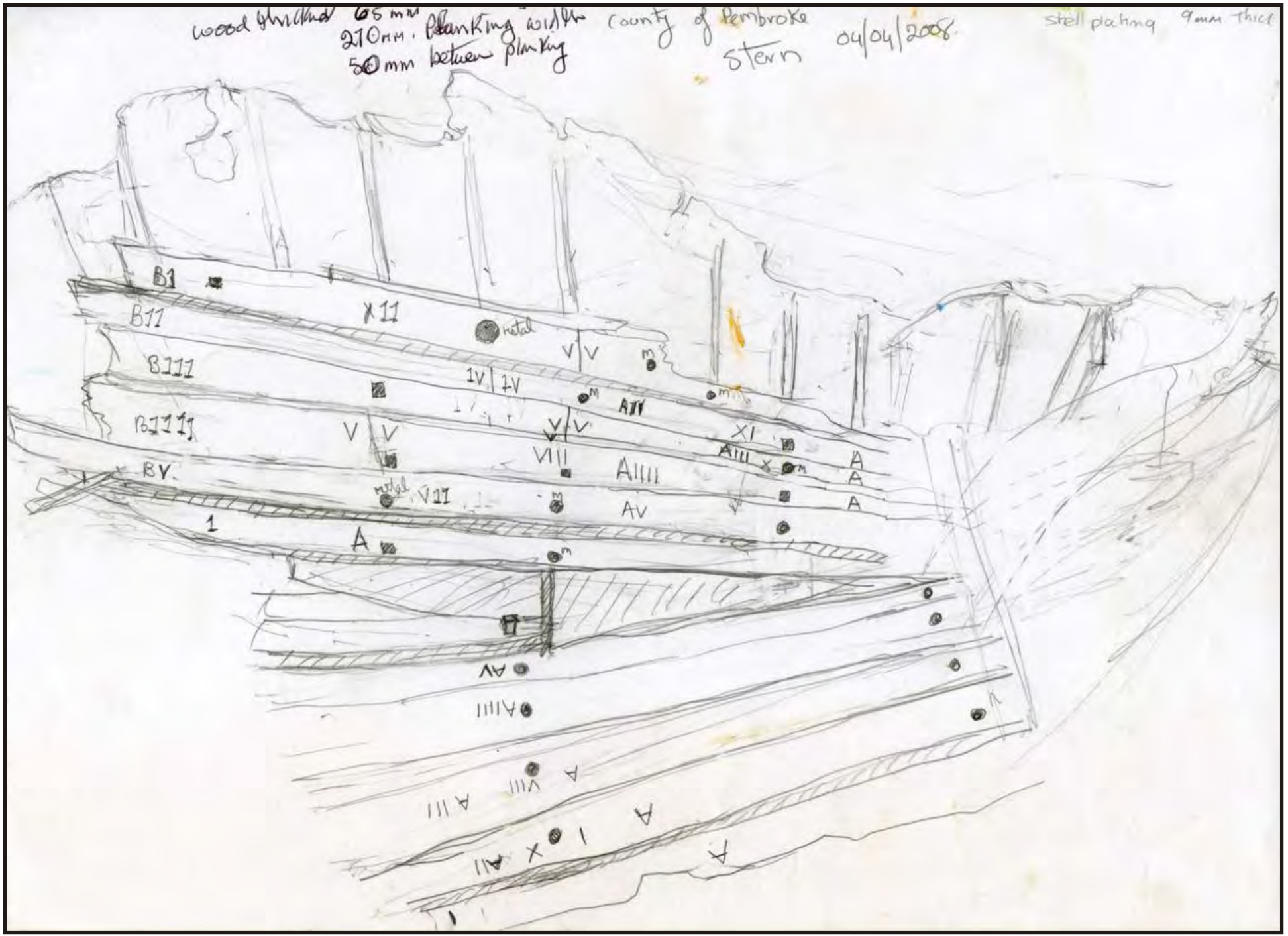


Figure 270: Field sketch of the *County of Pembroke* stern, showing the positions of the cargo hold ceiling marks. (Drawing Charlotte Firbank-King)

The following photographs are close-ups of the cargo hold ceiling marks laid out in Figure 270, from left to right on the starboard section followed by the markings on the port section.

Starboard

Figure 271: Ceiling marking - B I (Photo V. Maitland)

Figure 272: Ceiling marking - B II (Photo V. Maitland)

Figure 273: Ceiling marking - BIII (Photo V. Maitland)

Figure 274: Ceiling marking - BIIII (Photo V. Maitland)

Figure 275: Ceiling marking - BV1 (Photo V. Maitland)

Figure 276: Ceiling marking - I (Photo V. Maitland)

Figure 277: Ceiling marking - XII (Photo V. Maitland)

Figure 278: Ceiling marking - V V (Photo V. Maitland)

Figure 279: Ceiling marking - VII (Photo V. Maitland)

Figure 280: Ceiling marking - A (Photo V. Maitland)

Figure 281: Ceiling marking - IV IV (Photo V. Maitland)

Figure 282: Ceiling marking - V V (Photo V. Maitland)

Figure 283: Ceiling marking - V V
v
(Photo V. Maitland)

Figure 284: Ceiling marking - VIII (Photo V. Maitland)

Figure 285: Ceiling marking - A II (Photo V. Maitland)

Figure 286: Ceiling marking - A IIII (Photo V. Maitland)

Figure 287: Ceiling marking - A V (Photo V. Maitland)

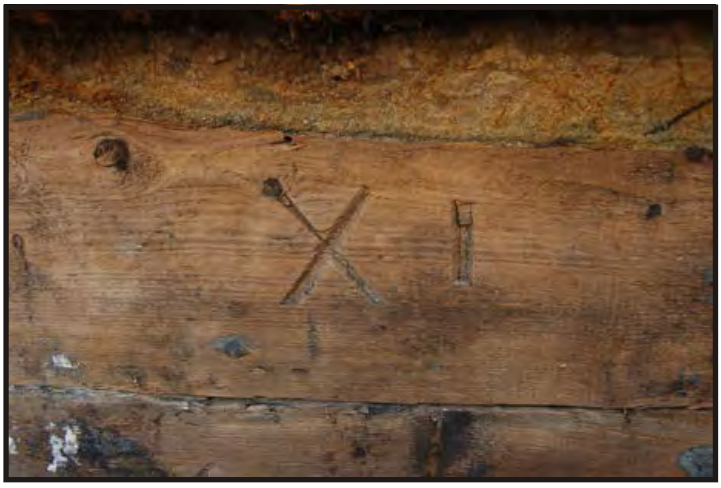


Figure 288: Ceiling marking - X I (Photo V. Maitland)

Figure 289: Ceiling marking - A III X (Photo V. Maitland)

Figure 290: Ceiling marking - A (Photo V. Maitland)

Figure 291: Ceiling marking - A (Photo V. Maitland)

Figure 292: Ceiling marking - A II (Photo V. Maitland)

Port

Figure 293: Ceiling marking - A (Photo V. Maitland)

Figure 294: Ceiling marking - A (Photo V. Maitland)

Figure 295: Ceiling marking - I X AII (Photo V. Maitland)

Figure 296: Ceiling marking - A V III A III (Photo V.

Figure 297: Ceiling marking - A IIII (Photo V. Maitland)

Figure 298: Ceiling marking - A V (Photo V. Maitland)

Figure 299: Ceiling marking - I (Photo V. Maitland)

Figure 300: The ceiling in the hold shows the side stringers projecting above the ceiling. Thin filler planks are visible at the bottom of the photograph. (Photo V. Maitland)

Figure 301: Close-up of the hold ceiling showing the general layout of the markings. (Photo V. Maitland)

Figure 302: The ceiling was attached to frames with iron bolts. (Photo V. Maitland)

Figure 303: Wooden dowels are used intermittently throughout the cargo ceiling. I don't think these formed part of the attachment system as they were not carefully fitted or glued like the deck dowels. They may have been used as fillers for knot holes or other holes in the planks. (Photo V. Maitland)

Figure 304: Wooden dowel in the hold ceiling, this one is particularly badly fitted. (Photo V. Maitland)

Figure 305: Intercostal wooden block. (Photo V. Maitland)

Rudder

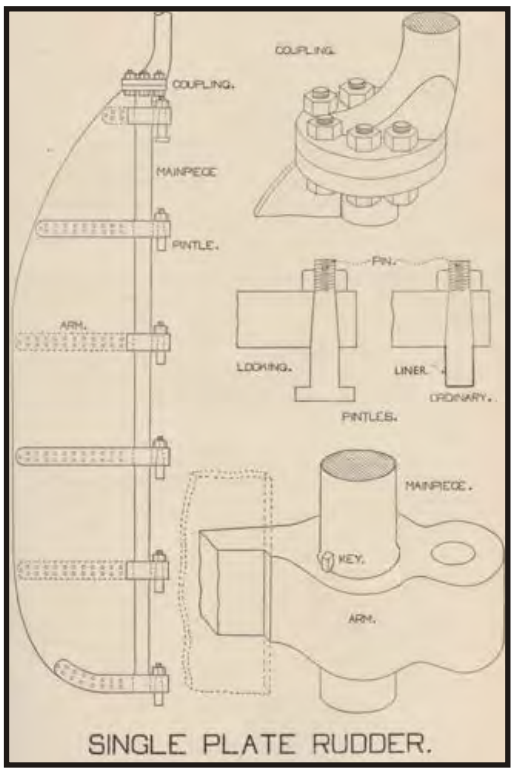


Figure 306: Diagram of a single plate rudder on an ordinary stern. The upper part of the stern or transom extended abaft the rudder post (Pursey 1942:116; Drawing H.J. Pursey).

The only person that saw the rudder was Subtech's diver, Colin Donald, in 2004. It was lying to the rear of the wreck during the Debris Removal Project of 2004. Apparently the rudder was similar to this diagram. It is not known what happened to the rudder. According to the Lloyds' Survey of 1881, the rudder had a diameter at the head of 5½" and 3" at the heel; it could be unshipped afloat.

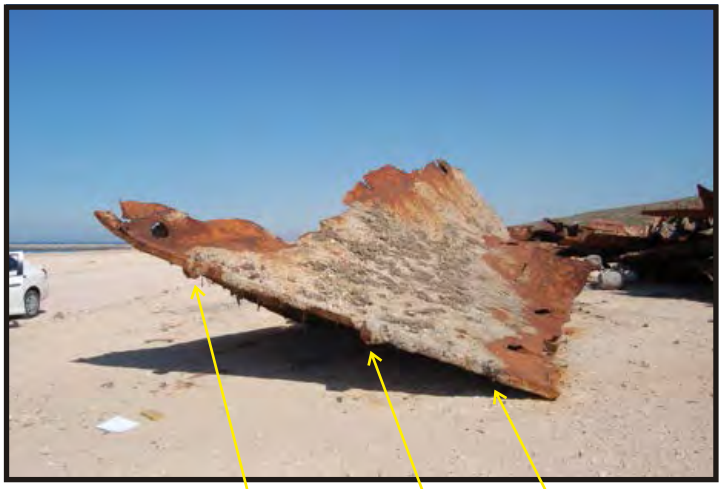


Figure 307: Rudder post with three gudgeons. These are eyes into which the rudder pintles fit. (Blackburn 1981:148; Photo V. Maitland)

Figure 308: Close up of the sheared off rudder post. (Photo V. Maitland)

Figure 309: Gudgeon for the bearing pintle. (Photo V. Maitland)

Figure 310: Close-up of the gudgeon, encrusted with barnacles. (Photo V. Maitland)

Deck Equipment

Figure 311: View from the foremast looking down to the foredeck and bowsprit of the *Lawhill*. The anchor release mechanism is between the bitts and bollards on each side. Catheads can be seen on either side. (Spencer 1997:21; Photo G. Belton)

Bollards and Bitts

Figure 312 - 313: Bollards are stout vertical posts used for securing the lines when a ship is moored. They usually appear in pairs sharing the same base, which is fixed to the vessel rather than being an integral part of the vessel as are the bitts, which are often used for the same purpose (Blackburn 1981:44). These bollards were made of cast iron and they attached to a shaped wooden piece; this in turn was attached to the deck planking, which was attached to the rider plate. (Photos . V. Maitland)

Figure 314: Close-up of the bollard, bollard plank, deck plank and rider plate. (Photo V. Maitland)

Figure 315: Close up of shaped end of the bollard plank. (Photo V. Maitland)

Figure 316: Close-up of rider plate and deck bolts. (Photo V. Maitland)

Figure 317: A different type of bollard, broken in half. While this bollard is also made of cast iron, it has a square brass bolt and 'washers' on top. (Photo V. Maitland)

Figure 318: Top view of the bollard. The shaped bollard plank attached to the deck is visible. (Photo V. Maitland)

Figure 319: Close-up of the bollard top, with a square bolt and three brass 'washers'. (Photo V. Maitland)

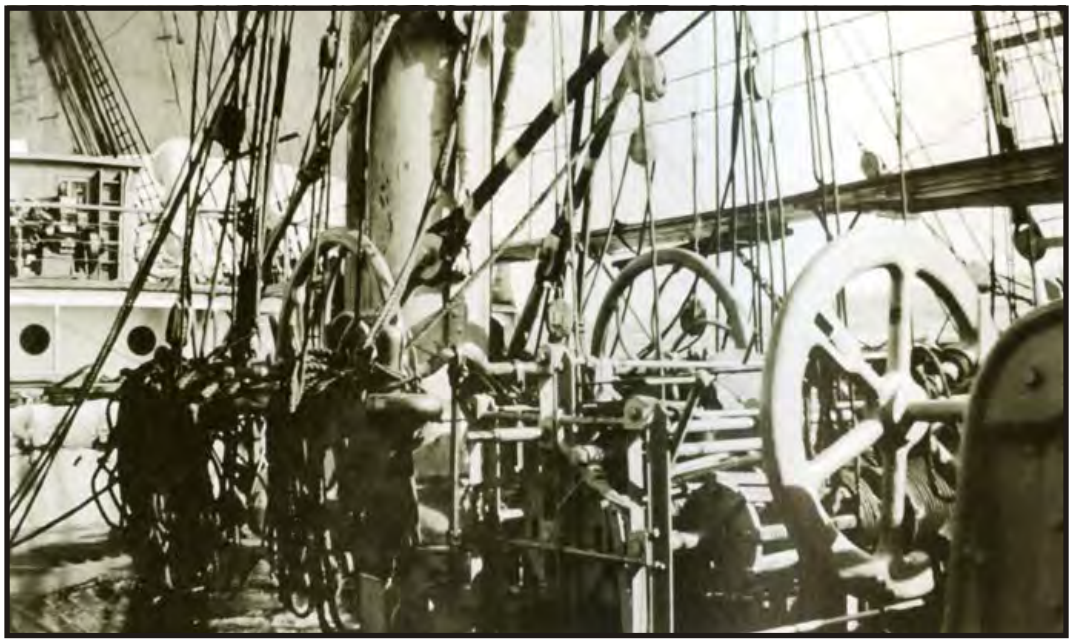


Figure 320: The *Passat*, a steel, 4-masted barque, built in 1911. Machinery is clustered around her main mast - there is a halyard winch, brace winch and the main pump. While this equipment is much larger and different from the *County of Pembroke's* machinery, is does give some idea of what was found on sailing decks in the late 1800s and early 1900s.

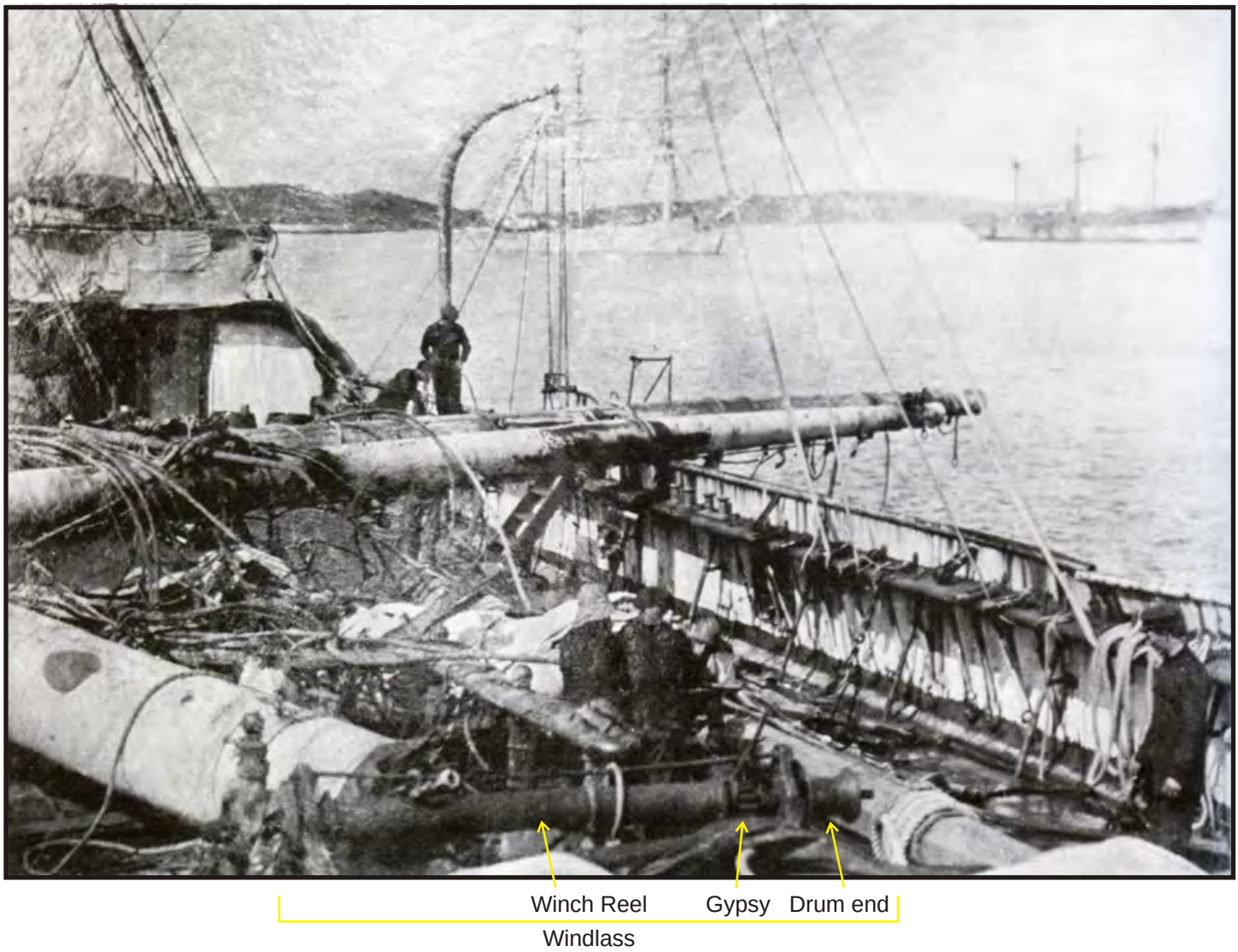


Figure 321: The dismasted *Wavertree*, an iron sailing vessel. The windlass can be seen next to the mast and fife rail (Photo Allen 1978:116). A windlass is a horizontal drum, around which a rope or line is passed. They are commonly found on masts to assist with moving ropes up and down. A gypsy is an attachment to a windlass which allows the windlass to take chain. Chain is normally moved with the help of a capstan and cable holders, but when these are absent their place is taken by the gypsy attachment on a windlass (Blackburn 1981:150; 341).

Figure 322: Drum end and winch reel of a small windlass, possibly for moving and tightening yards and stays. (Photo V. Maitland)

Figure 323: View from top of the drum end and winch reel. Cog on the far end possibly to attach to a gypsy. (Photo V. Maitland)

Figure 324: Cog of the windlass. (Photo V. Maitland)

Figure 325: Close-up of the drum end of windlass. (Photo V. Maitland)

Figure 326: Drum end of windlass. Directly to the right of the drum is a gypsy. (Photo V. Maitland)

Figure 327: Top view of windlass drum end. (Photo V. Maitland)

Figure 328: Side view of gypsy, part of the windlass. (Photo V. Maitland)

Figure 329: Close-up of gypsy, part of the windlass. (Photo V. Maitland)

Figure 330: View of the bottom of the gypsy. (Photo V. Maitland)

Figure 331: Top view of a possible gypsy. This piece of equipment was heavily encrusted with marine growth, it may be a different type of gypsy, perhaps for a larger windlass. (Photo V. Maitland)

Figure 332: Side view of the possible gypsy. (Photo V. Maitland)

Figure 333: This may either be a drum end of a windlass or a winch, which is a small vertical drum around which a rope or line is passed in order to make it easier to pull the rope. The principle difference between the two, is a windlass is horizontally mounted on the deck while a winch is vertically mounted and is an integral part of the deck. (Blackburn 1981:341; Photo V. Maitland)

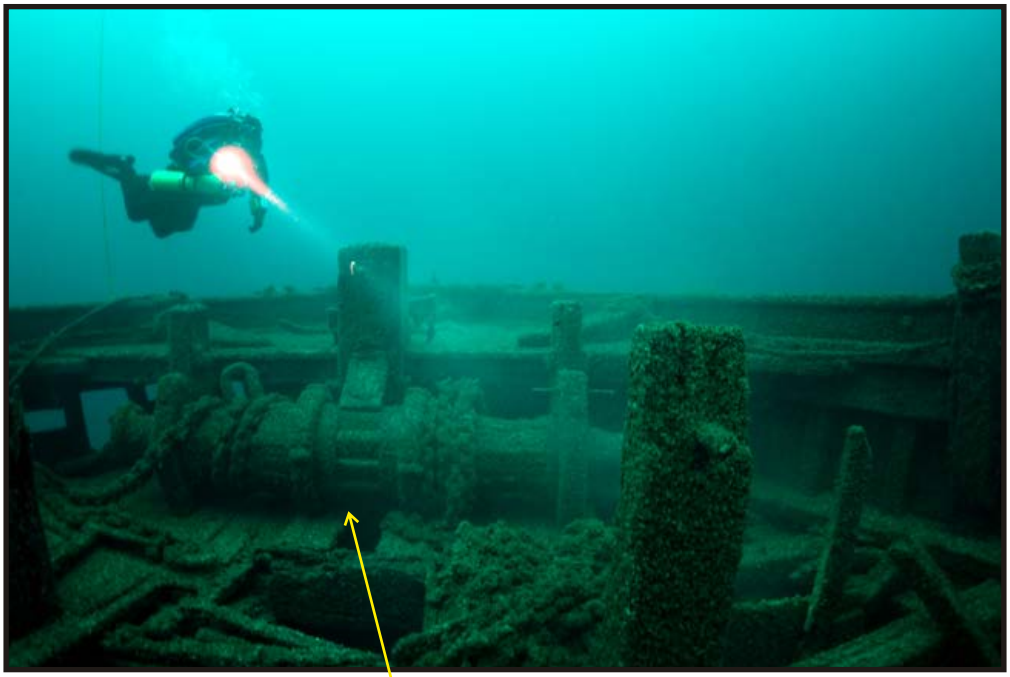


Figure 334: Anchor windlass aboard the *Rouse Simmons*, a 3-masted schooner wrecked in Lake Michigan in 1912. (Photo T. Thomsen; www.seagrant.wisc.edu)

Figure 335: Anchor windlass from the *County of Pembroke*, recovered in 2004. (Photo V. Maitland) Bisset (1958:89) states that, on arriving at their destination, "We now raised the anchor cables from the chain lockers, ranged them on deck abaft the windlass, and shackled the end to the anchors". While negotiations with the harbour pilot were in progress, all hands were "...busy forrard since dawn unlashing the two old-fashioned heavy iron anchors on the forecastlehead, and getting ready to let go". He describes (1958:69) the windlass as having heavy iron levers which were unshipped during sailing and lashed to the bitts near the fo'c'slehead and the use of it, "…we manned the windlass and began to heave up and down on the long levers, to the song of 'Rolling Home.' This type of windlass was known as 'the Armstrong Patent.' Some idea of its efficiency may be gathered from the fact that it required more than two hours' hard heaving to get in the seventy-five fathoms of cable link by link and break the anchor out of the rocky bottom." (Bisset 1958:202). Armstrong Patent is an expression from the turn of the 19th century to represent a vessel with no patent mechanical aids and had to rely on the strength of crews' arms (Blackburn 1981:15).

Capstan

Figure 336: Capstan. Bisset (1958:35,187) describes seeing men, when he first arrived on the *County of Pembroke*, trudging around the capstan in the waist on the main deck abaft the mainmast and, later in his apprenticeship being sent forward to the "f'o'clehead to trudge around the capstan, helping to heave up the anchor to the hoarse strains of 'Rolling Home'," A capstan is an upright cylindrical device for turning ropes attached to heavy objects such as anchors and large sails. The *County of Pembroke's* capstan was manual. The drumhead on the top of the capstan had pigeonholes into which the capstan bars were fitted so that the capstan could be turned. The barrel of the capstan had raised whelps, these provided purchase for the ropes. The base was fitted with pawls, these kept the capstan from recoiling when it was turned. (Blackburn 1981:69; Luce 1891:7;Tritton 1991:47; Photo V. Maitland)

Figure 337 : Men trudging around the capstan aboard the *Lawhill*. (Spencer 1997:20; Photo G. Belton)

Figure 338: Capstan drum head. (Photo V. Maitland)

Figure 339: Close-up of drum head. (Photo V. Maitland)

Figure 340: Bottom of capstan. (Photo V. Maitland)

Catheads and Anchors

The Lloyds' Survey of 1881, details the anchors on the *County of Pembroke* - 2 bower anchors of 30 cwt = 1 500 kg (centum weight or hundredweight roughly equivilent to 50kg); 1 bower anchor of 25cwt = 1 250 kg; 1 bower anchor of 11 cwt = 550 kg; 1 stream anchor of 7.5 cwt = 82.5 kg and 1 kedge anchor of 5 cwt = 55 kg.

According to Charles Winterbottom, the port coxswain, who kept a register of anchors and cables aboard all ships entering Algoa Bay, the *County of Pembroke* had three anchors - two bower anchors of 36 cwt each and a sheet anchor of 25 cwt. Although, later in the same report, it is stated that the anchor and cable register records there were 3 anchors of 36 cwt (The Eastern Province Herald 27-11-1903).

It is of course possible that, firstly, the smaller anchors were not important enough to record. Bisset (1958:150) states that the kedge anchor, with a three-inch manila rope cable, was used to check the vessel's drift. Or secondly, the anchors had changed since the 1881 survey.

Figure 341: Bows of the iron sailing vessel, *Wanderer*. The cathead holding the anchor at the bulwark can be seen with the anchor cable in the hawsepipe. (Villiers 1933:224)

Figure 342: Cathead from the *County of Pembroke*, recovered in 2004. (Photo V. Maitland)

A cathead projects from each side of the bow and an anchors is hung from them. Anchors these early iron ships used were difficult to lay flat because they were made with arms and flukes. They were easier to store when hung over the side, clear of the ship. Bisset (1958:89) states that the anchors were lashed to the fo'c'slehead. A cat davit was designed exclusively to raise the anchor once it was clear of the water (Blackburn 1981:72,73). Both of these features are visible on the high resolution picture of the *County of Pembroke* and are labelled in Figure 93. The anchor chain was attached to the anchor and this chain then went through the hawsepipes and onto the deck. Thereafter, it went over the anchor windlass and down through the spurling gate, a metal fitting in the deck (Blackburn 1981:294). Then the cable goes down the spurling pipe and into the chain locker where it is attached to a beam .

Ernest Bertram Beck, Harbour Master of Port Elizabeth, stated he visited the wreck of the *County of Pembroke* on 24-11-1903 and saw that she was full of water and likely to become a total wreck. He noted both chains through the hawse pipe, over the windlass and leading down into the chain locker which was under water (The Eastern Province Herald 28-10-1903).

Figure 343: Underside view of the cathead and its sheaves. (Photo V. Maitland)

Figure 344: View from the top of the cathead, sheaves are visible on the right. (Photo V. Maitland)

Figure 345: Close-up of cathead sheaves. (Photo V. Maitland)

Figure 346: This cast iron fitting is very different from the hawseholes and I believe it's a spurling gate leading to the spurling pipe, which leads to the chain lockers, where the anchor chains were stored. Pieces of the deck are attached to the underside.(Photo V. Maitland)

Chains, Cables and Ropes

Figure 347: Iron stream cable attached to wood. According to the Lloyds' Survey of 1881, the stream cable was 15/16" and 90 fathoms long and attached to the stream anchor. (Photo V. Maitland)

Figure 348: Close-up of the stream cable, it's much thinner than the bower cables. (Photo V. Maitland)

Figure 349 - 350: Bower cable. According to the Lloyds' Survey of 1881, the *County of Pembroke* had 270 fathoms of 1¾" chain. The Eastern Province Herald (27-11-1903),states the *County of Pembroke* had two chains of 135 fathoms each and 1¾ inches in thickness, this tallies with the Lloyds' Survey. In Figure 349, it appears that there is a hawse pipe or a spurling pipe above where the chain is attached to the beam. Figure 350 is a close-up of the beam attachment. (Photos V. Maitland)

Figure 351: Remains of the bower cable. (Photo V. Maitland)

Figure 352: Chain links after it was brought up from the wreck. (Photo V. Maitland)

Figure 353: Chain links with a stud in the links. (Photo V. Maitland)

Figure 354: Chain links, after the stud was removed. (Photo V. Maitland)

Figure 355: Close-up of the top of the chain stud. Studs were fitted in the links to keep the chain from kinking and added strength to the chain. (Brown 1931:119; Photo V. Maitland)

Figure 356: Close-up of the side of the chain stud. (Photo V. Maitland)

According to Bisset (1956:65-6) sailors didn't like to use the term ropes and every cable and rope is referred to by a name – such as – halliards, braces, sheets, lifts, clew lines, buntlines, leach lines, downhauls, robands, gaskets, stirrups, shrouds, ratlines, stays, hawsers, springs, warps, whips, lashings, lanyards, painters etc. Bisset states that there were only seven so-called “ropes” on the *County of Pembroke*, these were the:

1. Footropes - on which men stood while working out on the yards
2. Boltropes - sewn around the edges of the sails
3. Wheel ropes - for steadying the steering gear
4. Man ropes - for safety purposes on gangways and pilot ladders, although these were known as lifelines when rigged fore-and-aft along decks awash in heavy weather
5. Bucket ropes - for hauling up buckets of seawater overside
6. Tow ropes - for towing by tugs or other craft, also known as hawsers
7. Boat ropes - for securing boats alongside or astern, also known as painters

Figure 357: Lloyds' Survey of 1881 states that the ropes on the barque were manilla. These strands were made from two yarns. Normally strands were made by twisting three yarns together (Luce 1891:598). (Photo V. Maitland)

Figure 358: Manilla cable. Fourteen, two-yarn strands were twisted together to form a rope and two ropes were twisted together to form a cable. Each layer is twisted in alternating directions to give the final cable greater strength and distribute the strain among the fibres (Luce 1891:598). (Photo V. Maitland)

Figure 359 - 360: Strands, ropes and cables were wrapped and lashed on various parts of the wreck. I don't know which were pre-wreck and which were used during the 1904 salvage operation. According to Bisset (1958:93), during quiet times onboard the crew blacked down the rigging. This involved rubbing tar into the rope rigging in order to preserve the manilla (Blackburn 1982:39). (Photo: V. Maitland)

Figure 361 - 362: Wire rope. According to the Manual of Seamanship (1951:89), wire rope consists of many small wires extending continuously throughout its length, these are twisted into strands; the strands are twisted around a jute or hemp heart. The wire ropes from the *County of Pembroke* were wrapped with manilla, hemp or jute. The heart acts as a cushion into which the strands bed, giving the rope more flexibility. The heart and covering absorbs the oils with which the ropes are treated. As the ropes are stretched or flexed, the oils are squeezed between the wires lubricating them and reducing friction. According to Bisset (1956: 214) slush was mixed with Stockholm tar for greasing down the rigging, masts and for splicing ropes. (Photos V. Maitland)

Figure 363: Section of wire rope showing the disintegrated manilla covering and exposing the wires beneath. (Photo V. Maitland)

Figure 364: Wire rope without a manilla covering. (Photo V. Maitland)

Figure 365: Manilla covered wire rope. (Photo V. Maitland)

Figure 366: Spliced thimble. (Photo V. Maitland)

Figure 367 - 370: Numerous bundles of these knotted rags were found throughout the upper areas of the wreck. There are three possible explanations for these artefacts:

- Baggywinkles - These were pieces of old rope woven together and wrapped around other ropes to reduce chafing (Blackburn 1982: 24).
- Hawsebag - A stuffed canvas bag that was used to block the hawseholes when a ship was at sea to prevent water entering the ship (Blackburn 1982:156).
- Puddening - Rope matting used to protect various parts of the ship from chafing, friction and wearing (Blackburn 1982:245). (Photos V. Maitland)

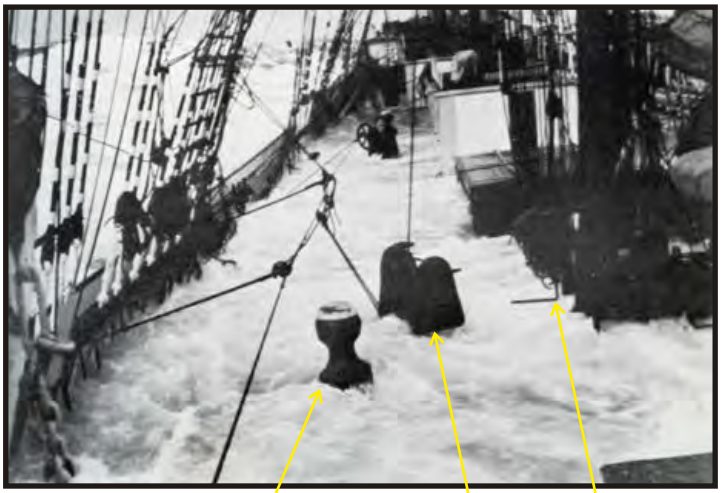


Figure 371: View of the *Parma's* deck. (Villiers 1933:80)

Figure 372: Close-up of pump on the *Parma's* deck. (Villier 1933:49)

Figure 373: Pump. Two of these were found. This is the discharge end of the pump. According to the Lloyds' Survey of 1881, the *County of Pembroke* had two metal chambered pumps aboard. Bisset (1958:52,201) states that the fresh water was stored in two iron tanks set amidships in the hold. Water was drawn with a hand pump on deck into buckets. The ration per man per day was three quarts. The other pump may have been a bilge pump. (Photo V. Maitland)

Figure 374: Top of chambered pump. (Photo V. Maitland)

Figure 375: Bottom of pump. The pipe and remains of the deck are visible. (Photo V. Maitland)

Figure 376: The name of the pump manufacturers. Unfortunately all that is visible is A.B. FRA... Manufacturers and Patentees Liverpool N^{o} 2.15. (Photo V. Maitland)

Figure 377: Possible anchor release mechanism, similar to that shown on the *Lawhill* in Figure 311. (Photo V. Maitland)

Figure 378: Possible anchor release mechanism from the other side. (Photo V. Maitland)

Figure 379: Close-up of cog on the possible anchor release mechanism. (Photo V. Maitland)

Figure 380: Possible anchor release mechanism, a different angle. (Photo V. Maitland)

Figure 381: Different angle of the cog. (Photo V. Maitland)

Figure 382: Close-up of the possible anchor release mechanism. (Photo V. Maitland)

Figure 383: Possible handle for the hand pump. (Photo V. Maitland)

Figure 384: Unknown piece of deck equipment, heavily encrusted. (Photo V. Maitland)

Figure 385: Deck bee, which is a ring of metal through which a line may be led. (Blackburn 1981:32; Photo V. Maitland)

Figure 386: Close-up of deck bee. (Photo V. Maitland)

Figure 387: Imprint and bolts of deck rigging or equipment. (Photo V. Maitland)

Figure 388: Davit. The two davit radial type, was used where only manpower and rope tackles were available. It's slow, cumbersome and awkward to work, especially when the boats were housed inboard as on the *County of Pembroke*. (Brown 1931:85; Photo V. Maitland)

Figure 389: In-situ piece of equipment, found below deck level. It may have been part of the steering gear. (Photo Subtech)

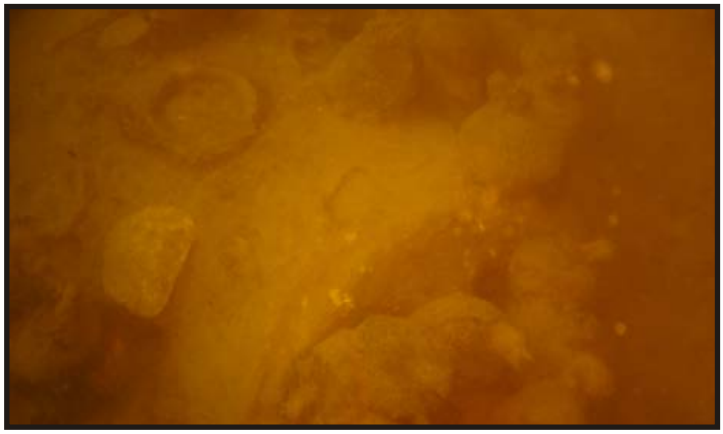


Figure 390: In-situ piece of equipment. (Photo Subtech)

Figure 391: Ring bolt or bee. (Photo V. Maitland)

Figure 392: Metal grating. Bisset (1958:59) states that the crew scrubbed the wheel box gratings with sand and canvas. (Photo V. Maitland)

Figure 393 - 394: Railings. The railings around the bow of the barque were known as the pulpit rail. Those in the stern were known as the pushpit or monkey rail. (Photos V. Maitland)

Figure 395: Brass non-slip tread showing the rough side. It was probably nailed to companionways. (Photo V. Maitland)

Figure 396: Underside of non-slip tread. (Photo V. Maitland)

Figure 397 - 398: Figure 397, deck side of a piece of skylight. Figure 398 is the underside. (Photos V. Maitland) On the voyage to Australia in November 1898, 300 miles to the south of the Cape of Good Hope, the *County of Pembroke* was running before a gale and had heaved to in order to wait for the wind to drop a little. A gigantic wave crashed from astern onto the poop and the wave stoved in and carried away the teakwood, glass cabin skylight, companionway and binnacle. Water flooded the compartments and alleyways under the poop. The ship came very close to being sunk and all hands set to repair the damages, batten down the holes and save whatever stores they could. The flooded areas were bailed out with buckets hauled up on lines (Bisset 1958:84-87).

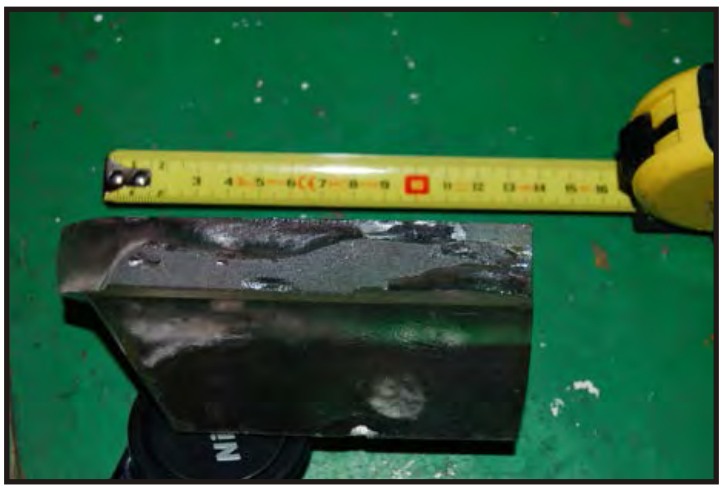


Figure 399: Side of skylight. (Photo V. Maitland)

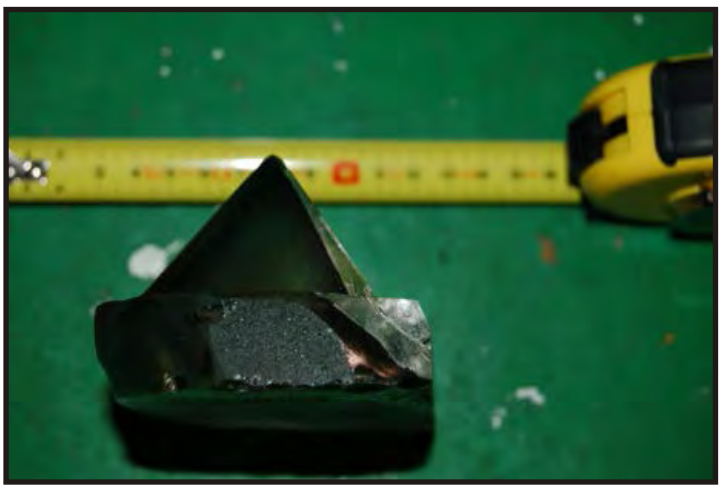


Figure 400: Cross-section of skylight. (Photo V. Maitland)

Figure 401 - 402: This curved wood has brass bolts inserted. The *County of Pembroke* had four boats. One was used by the crew to get ashore and the Eastern Province Herald (05-02-1904) advertised salvaged boats from the C*ounty of Pembroke*, but not how many. This may be a bow or stern section from one of the barque's boats.(Photos V. Maitland)

Figure 403 - 404: Two views of a turned wooden post, this may have been part of a fife rail or a balustrade on the poop deck. (Photo V. Maitland)

Figure 405: Top of the turned wooden post with an embedded brass nail.

Figure 406: Wooden pole. It had a metal band on the end, possibly to keep it from splitting. It also had a routed area that may have had a cleat or some other fitting. This may have been a belaying pin on the fife rail. (Photo V. Maitland)

Figure 407: Close -up of the end where the metal band was. (Photo V. Maitland)

Figure 408: Close-up of the routed area. (Photo V. Maitland)

Figure 409 - 410: Possible locker lid; the ring is missing. (Photo V. Maitland) A locker is a small cupboard, generally with a lid on top, used for keeping small articles on board. A locker ring is a loose ring held in a plate, mounted flush with the surface but is always free, and easy to get hold of (Blackburn 1981:199).

Figure 411: Bolster. (Photo V. Maitland) This is a piece of wood that is attached as needed to prevent damage from the chafing of moving parts (Blackburn 1981:44).

Figure 412: Copper nail. (Photo V. Maitland)

Figure 413: Iron nails. (Photo V. Maitland)

Figure 414: Iron, threaded bolt. (Photo V. Maitland)

Figure 415: Two iron bolts with nuts and a large, square brass nail. (Photo V. Maitland)

Figure 416: Iron and brass fastener. (Photo V. Maitland)

Figure 417: Copper sheeting. This was used to cover repairs to the wood. (Photo V. Maitland)

Figure 418 - 419: Metal buckets corroded together. (Photo V. Maitland) Bisset (1958:201) discusses the *County of Pembroke's* buckets in the following extract, "...the hold was filled to the deckhead, with 1,000 tons of guano, rammed into every corner and packed tightly around the two iron fresh water tanks. These, as in all sailing vessels, were set amidships in the hold, abaft the mainmast, and water was drawn from them into buckets by a hand pump on deck, for our whack of three quarts per man per day."

Figure 420: Shovel handle. (Photo V. Maitland) According to Bisset (1958:156-7, 194) "...certain items of equipment were more likely to be stolen while the vessel was in port, these included: the shark hook, paint brushes and other light gear. This equipment was stored in the Mate's cabin. Certain cargoes required shovels to load and offload; however, there were only four shovels aboard the barque."

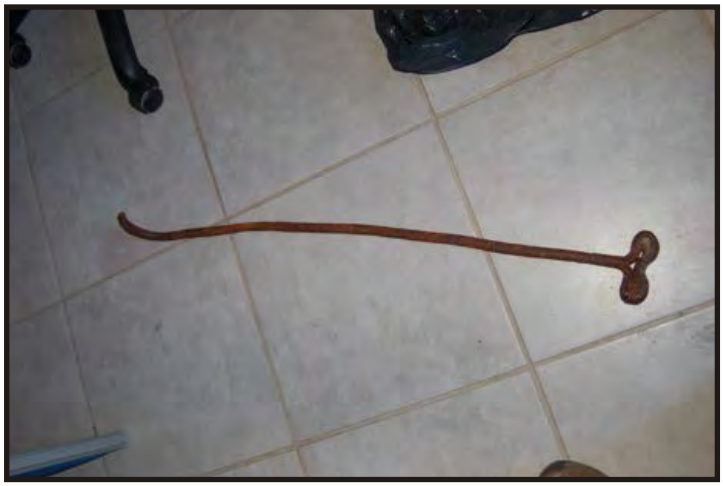


Figure 421: Chain-hook. (Photo V. Maitland) According to Luce (1891:276) hook ropes are single ropes with a hook on one side. These were used in lighting along the chain in conjunction with the above long handled chain-hook.

Figure 422: Paint brush. (Photo V. Maitland) Bisset (1958:109-10) relates how sometimes in clement weather, the captain would decide to give the masts and yards a fresh coat of white paint. All hands were sent aloft with brushes and pots of paint. However, on the journey of 1898-1899 during the night, after painting all the masts, a sandstorm blew over the sea from the Sahara Desert over 1000 miles away. This caused all the new paint to be covered in fine red dust. There was not enough paint to redo the job and the *County of Pembroke* had to go into her home port with red masts.

Figure 423: Wooden handle. (Photo V. Maitland)

Figure 424: Wooden axle and wheels, probably from a deck trolley. The remains of iron bolts on the axle are visible. (Photo V. Maitland)

Figure 425: Two wooden axles and the remaining wheels. (Photo V. Maitland)

Figure 426: Close-up of wooden axle and wheel showing the pin holding the wheel on. (Photo V. Maitland)

Figure 427: Front side of unknown artefact, possibly part of waterproof clothing or canvas bag. (Photo V. Maitland)

Figure 428: Underside of Figure 427. (Photo V. Maitland)

Figure 429: Side view of a rubber boot. (Photo V. Maitland)

Figure 430: Sole of the rubber boot. (Photo V. Maitland)

Figure 431: Top view of the rubber boot. (Photo V. Maitland)

Figure 432 - 433: Metal fork, the stamp on it states "Industrial & Commercial Cafeterias (Pty.) Limited". (Photos V. Maitland)

Masts and Rigging

Figure 434: Full-rigged, steel, three-masted barque from the end of the nineteenth century. This is very similar to what the *County of Pembroke* must have looked like in full sail. (Drawing E.W. Petreius in Edwards 1954)

According to the Lloyds' Survey of 1881, when the County of Pembroke was built, the "Masts, Bowsprit, Yards, &c., are Wood and Iron in Good condition, and sufficient in size and length. Samples of the iron of which the masts were made have been tested as per Committees suggestions and proved to be of good quality."

When I first started looking at the *County of Pembroke*, I deduced which mast was which by studying their positioning in relation to the wreck, they were lying next to the wreck and were removed as part of the Debris Removal Project in 2004. However, I have since discovered that the salvors of 1904 dismasted the wreck when they removed the barque from North End Beach. Therefore, the primary context of the masts had been disturbed. I studied the various mast sections in order to discern their identity.

Figure 435: Looking forward from the main mast of a barque. (Bisset 1958:81)

Figure 436: Looking aft from the main mast of a barque. (Bisset 1958:80)

According to Bisset (1958:72), there were only a few wooden spars on the *County of Pembroke*; the majority were made of iron. The only wooden ones were: the fore and main topgallant masts, the gaff on the spanker and a few others.

The masts featured in a number of exciting anecdotes aboard the *County of Pembroke*.
In 1899, as the *County of Pembroke* was passing Cape Horn, a sudden squall hit her; "...the fore topgallant mast - a wooden spar about 50 feet long - snapped off sheer just above the fid and crashed to the deck and over the bulwarks on the lee side." The captain ordered everyone forward to save whatever they could for repairs. The main danger came "...from the steel royal and topgallant yards, crossed on the fallen mast, which were battering against the barque's side with a frightful clatter as she rolled wildly in the confused cross seas raised by the hurricane squall. This battering threatened to make a hole in the hull plates or to spring the rivets, near or below the waterline." The crew went forward, cutting away lines and attaching others to the fallen masts and spars in order to haul them back; this was achieved by a super human effort. Once onboard they were securely lashed to avoid further damage. While everything was stowed away and any lines saved for further use, the carpenter trimmed the splintered base of the topgallant mast and the huge spar was sent aloft, to rerig and stay it, it was then fidded into the topmast cap. Rerigging the ship with it yards and sail took another eight hours (Bisset 1958:102-5).

The next anecdote occurred on Bisset's (1958:123-4) second voyage as an apprentice. They had passed the Cape of Good Hope when "… the wind shifted a few points and she took a big sea over the lee rail. I was tailing onto the main brace with the other men of the watch, when my feet were swept away from under me by the surge of the water, and in another instant I was washed overboard! Encumbered as I was with thigh boots and oilskins, I had little chance of swimming, but luckily I managed to hold on to the loose end of the brace, which was trailing overside with me, washed there by the same sea that had carried me over the rail.
As I grasped the line, the barque rolled to windward, and I hung on, gasping for breath and trying to yell for help, but my

shipmates, who had ducked under the rail when the sea was shipped, had not seen me go overboard and my voice was lost in the roar of the wind and the waters.

The barque rolled to leeward again, shipping another sea. As I struggled and kicked, holding grimly onto the line, the sea washed me over the rail inboard! This time I made no mistake. I flung both arms around the fife rail at the base of the mainmast and clung on. My shipmates stood gaping at me. The Mate said, 'Where did you come from?'

I spat out a mouthful of saltwater and answered truthfully, 'I was washed overboard with one sea, sir, and washed back on board by the next!'

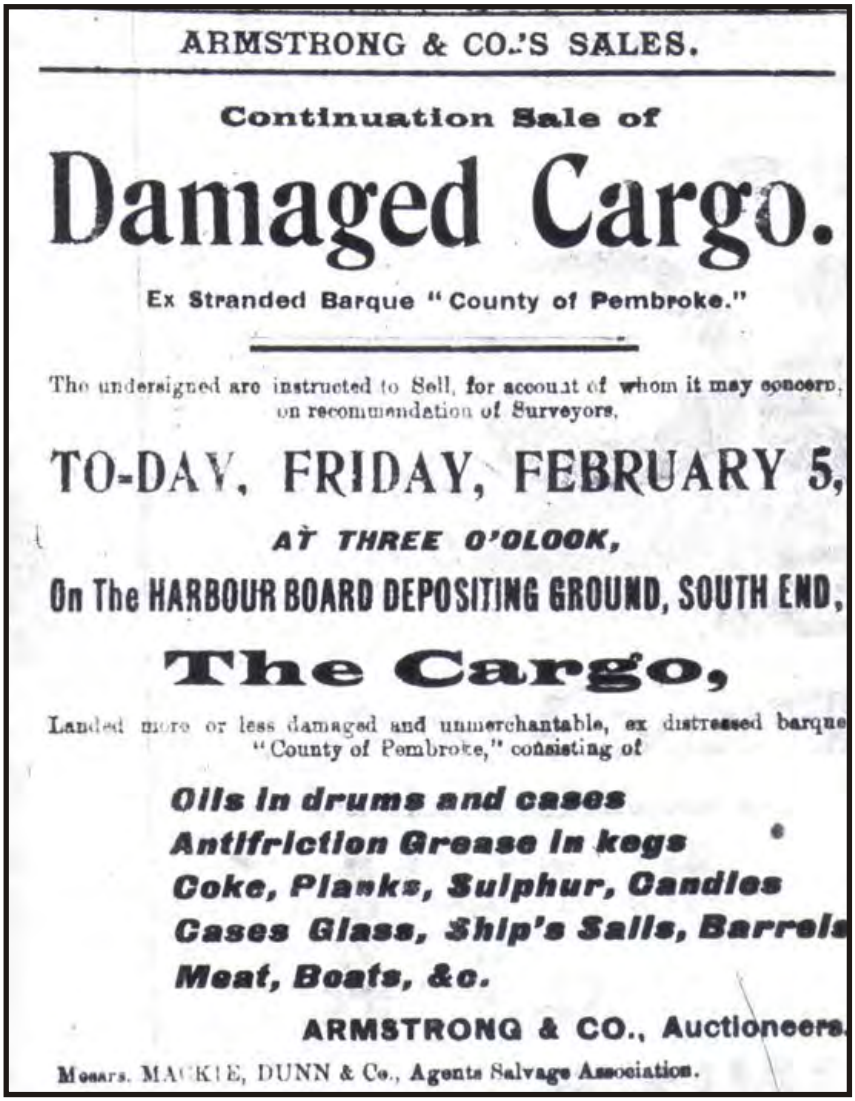
The Mate was the first to get over the general surprise at this astonishing statement. 'The next time you do a thing like that,' he said, 'I'll log you for attempting to desert ship!' "

During quiet time the masts were greased down with the cook's slush. (Bisset 1958: 93;214)

Figure 437: Scrambling up the shrouds to work on the masts, yards or sails (Villiers 1933:32). Aboard the *County of Pembroke* most of the lines for handling sail were belayed along the rail, amidships (Bisset 1958:82).

Figure 438: Making the main sail fast (Villiers 1949:128). Bisset (1958:82) states that sometimes they were balancing 100 feet or more above the deck.

The Lloyds' Survey of 1881 states that the *County of Pembroke* had two complete sets of sails of good quality, Bisset (1958:42-3)also said sails consisted of hard weather heavy sails or storm canvas and lighter canvas for fine weather latitudes.
At the time of wrecking the barque's sails were furled, although it was reported that some of these sails may have come loose. A John McAllister wrote a letter to The Eastern Province Herald stating "...before the vessel was aground distinctly observed her topsails filled and that her spars were white" (The Eastern Province Herald 17-11-1903). Nevertheless, most of her sails were no doubt in good condition, because when the *County of Pembroke* was salvaged in 1903 and 1904, the salvors offered up ship's sails and boats for auction (The Eastern Province Herald 05-02-1904).



ARMSTRONG & CO.'S SALES.

Continuation Sale of

Damaged Cargo.

Ex Stranded Barque "County of Pembroke."

The undersigned are instructed to Sell, for account of whom it may concern, on recommendation of Surveyors,

TO-DAY, FRIDAY, FEBRUARY 5,

AT THREE O'CLOCK,

On The HARBOUR BOARD DEPOSITING GROUND, SOUTH END,

The Cargo,

Landed more or less damaged and unmerchantable, ex distressed barque "County of Pembroke," consisting of

Oils in drums and cases
Antifriction Grease in kegs
Coke, Planks, Sulphur, Candles
Cases Glass, Ship's Sails, Barrels
Meat, Boats, &c.

ARMSTRONG & CO., Auctioneers.

Messrs. MACKIE, DUNN & Co., Agents Salvage Association.

Figure 439: Advert from The Eastern Province Herald (05-02-1904)

Masts

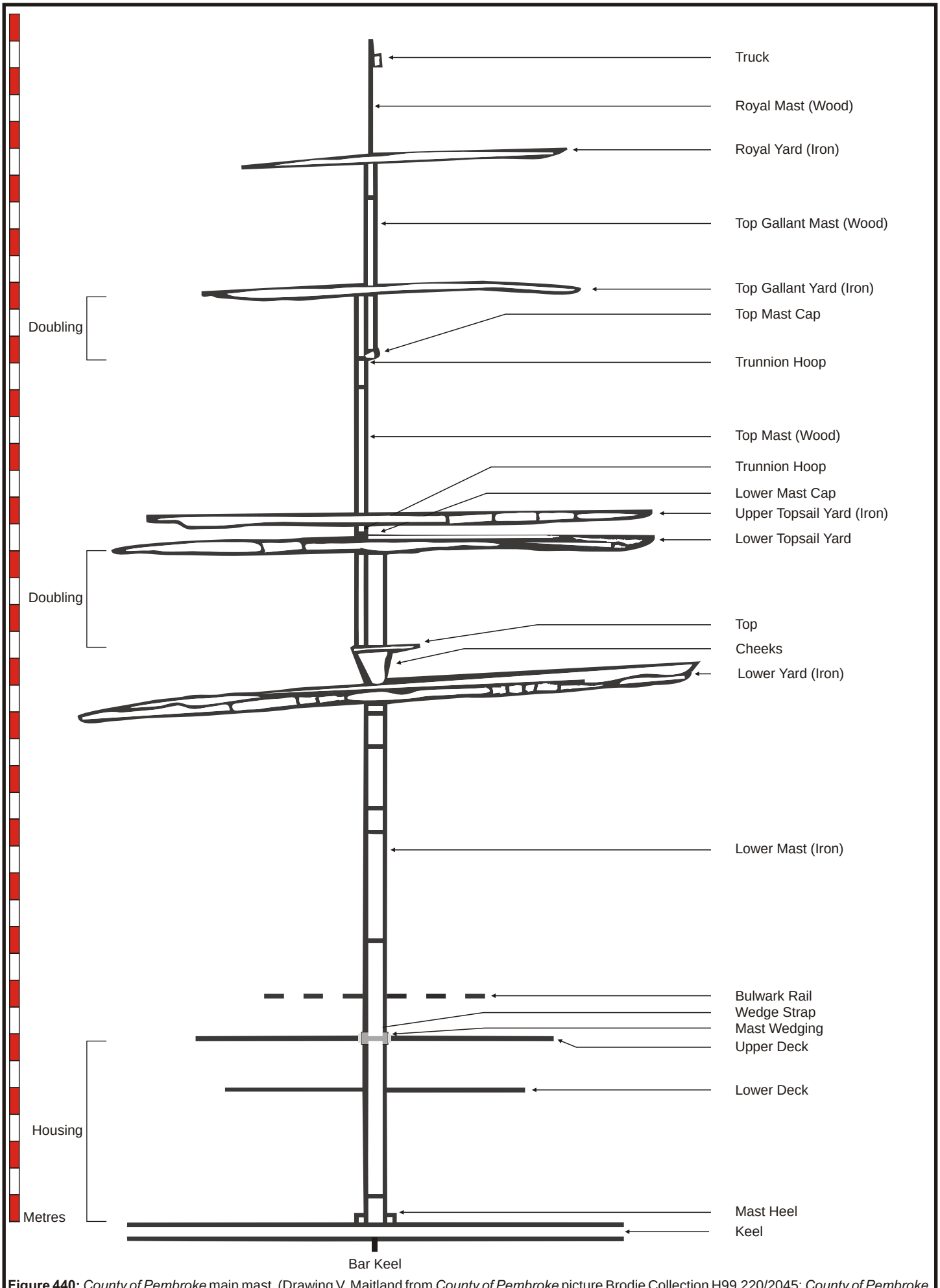


Figure 440: *County of Pembroke* main mast. (Drawing V. Maitland from *County of Pembroke* picture Brodie Collection H99.220/2045; *County of Pembroke* Lloyd's Report 1881; Her Majesty's Stationary Office 1951:163; Blackburn 1982:68,162, 320; Brown 1931: 53; Underhill 1938:84-6; Pursey 1942: 144-6)

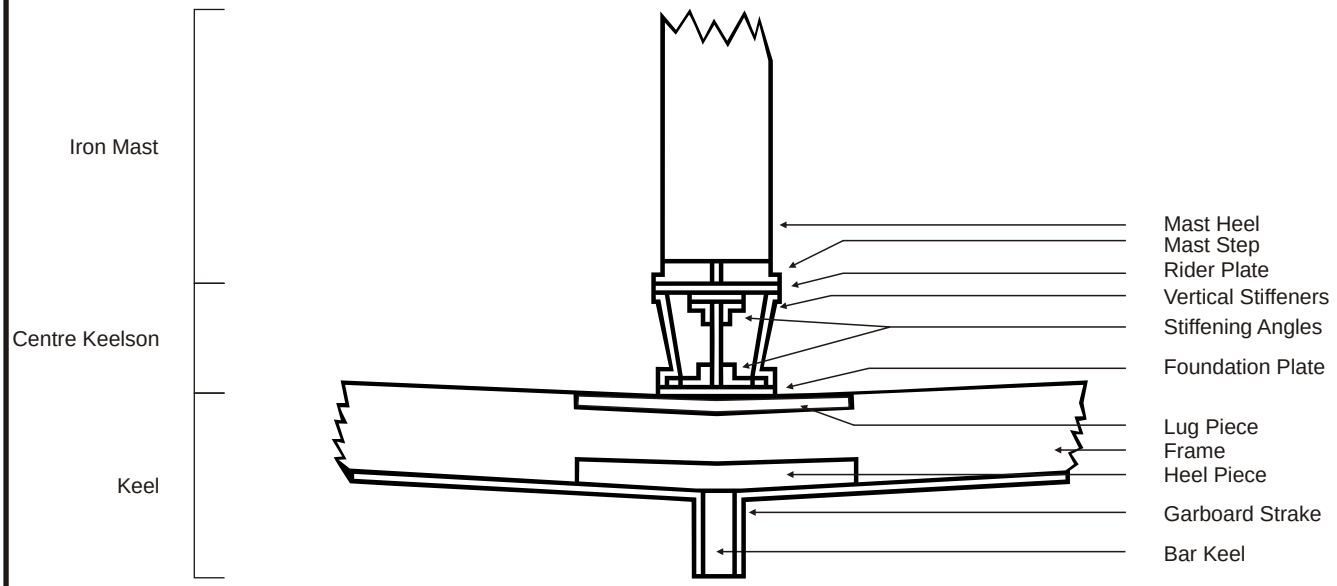


Figure 441: Mast heel stepped on the center keelson. (Drawing V. Maitland from site photographs, labels from Her Majesty's Stationary Office 1951:161; Brown 1931: 434-5)

Figure 443: Centre keelson and mast step. The downward thrust that a mast exerts at its heel means the mast must be strongly supported and stepped (Pursey 1942:144). By putting the mast through the decks, it added support to the mast. In the *County of Pembroke* the mast was stepped on the centre keelson; it had a reinforcing bracket where it's wider than the keelson. (Photo V. Maitland)

Figure 442: Centre keelson and mast step from the side. (Photo V. Maitland)

Figure 444: Close-up of the mast step. (Photo V. Maitland)

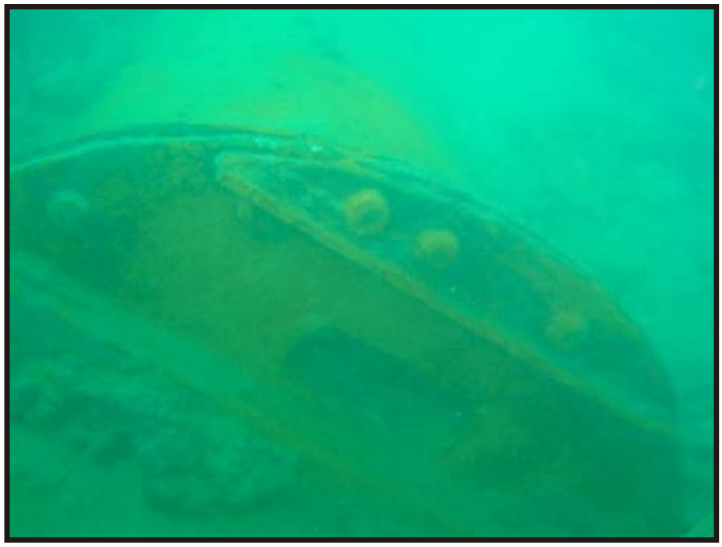


Figure 445: In-situ view of the mast heel. (Photo Subtech)

Figure 446: Mast heel. (Photo V. Maitland)

Figure 447: In-situ view of the broken mast before the cargo was removed. (Photo V. Maitland)

Figure 448: Section of mast with the wedge strap, this was a doubling of the mast where it went through the deck. (Photo V. Maitland)

Fore Mast

Foremast according to the Lloyds' Survey of 1881		
Length extreme	79' 3"	24.15 m
Diameter at Partners	28" & 7/16 thick	71.12 cm & 11.11 mm thick
Diameter at Heel	20" & 6/16	50.8 cm & 9.52 mm
Diameter at Hounds	22" & 6/16	55.88 cm & 9.52 mm
Diameter at Head	18" & 6/16	45.72 cm & 9.52 mm
Seams double riveted Butts below partners double Remainder treble riveted all straps 1/16 thicker than plates Mast doubled at wedging with 10' 0 x 7/16 plates		25.4 cm x 11.11 mm

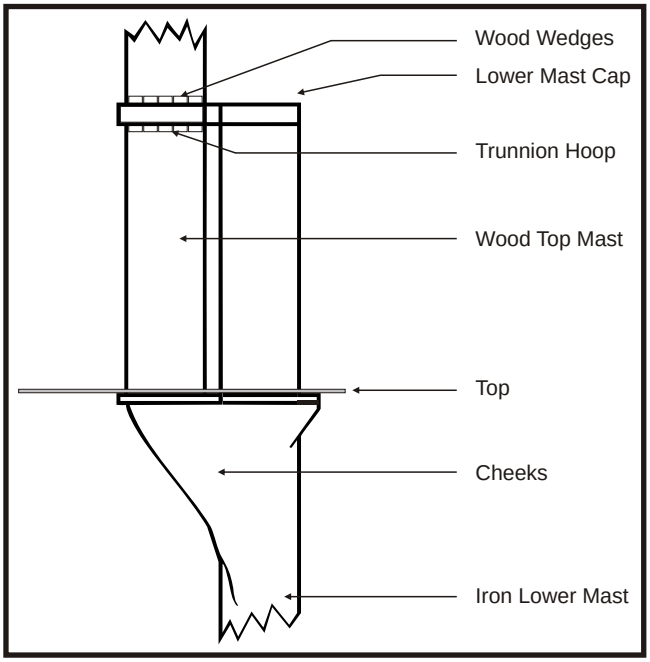


Figure 449: Lower mast head (Drawing V. Maitland from site photographs, labels from Her Majesty's Stationary Office 1951:163; Blackburn 1982:316,320)

Figure 450: Doubling of the lower iron mast and the wood top mast. The iron trestle trees are still there, but the top is missing. (Photo V. Maitland)

Figure 451: Close-up of the doubling. Cables from the rigging are still wrapped around the iron mast. (Photo V. Maitland)

Figure 452: Close-up of the cap of the lower iron mast and the trunnion hoop around the wood. It appears there are shaped wooden wedges between the hoop and the wood top mast. The metal apparatus may have been to tighten the trunnion hoop. (Photo V. Maitland)

Figures 453 - 454: Two different views of the trestle trees and doubling of the mast. (Photo V. Maitland)

Main Mast

Mainmast according to the Lloyds' Survey of 1881		
Length extreme	80' 3"	24.46 m
Diameter at Partners	28" & 9/16 thick	71.12 cm & 14.28 mm thick
Diameter at Heel	20" & 6/16	50.8 cm & 9.52 mm
Diameter at Hounds	22" & 6/16	55.88 cm & 9.52 mm
Diameter at Head	18" & 6/16	45.72 cm & 9.52 mm
Seams double riveted Butts below partners double Remainder treble riveted all straps 1/16 thicker than plates Mast doubled at wedging with 10' 0 x 7/16 plates		25.4 cm x 11.11 mm

Figure 455: Lower main mast. The bottom of the mast, just above the partners, is ringed with cleats. (Photo V. Maitland)

Figure 456: Cross-section view of the lower main mast. (Photo V. Maitland)

Figure 457: Lower main mast showing the clasp hoops, these are strong circles of iron driven onto masts with a hinge in the middle fastened together with forelocks through mortises (Steel 1794:6). (Photo V. Maitland)

Figure 458: Different view of the lower main mast and clasp hoops. (Photo V. Maitland)

Figure 459: Close-up of lower main mast cleats. These were used to belay ropes. (Photo V. Maitland)

Figure 460: Close-up of belaying cleat. (Photo V. Maitland)

Figure 461: Possible derrick attached to the lower main mast next to the belaying cleats. (Photo V. Maitland)

Figure 462: Close-up of possible derrick. (Photo V. Maitland)

Figure 463: Top of lower main mast. This section was attached to the section in Figure 455, but they separated during their removal in 2004. The top and trunnion hoop can be seen. (Photo V. Maitland)

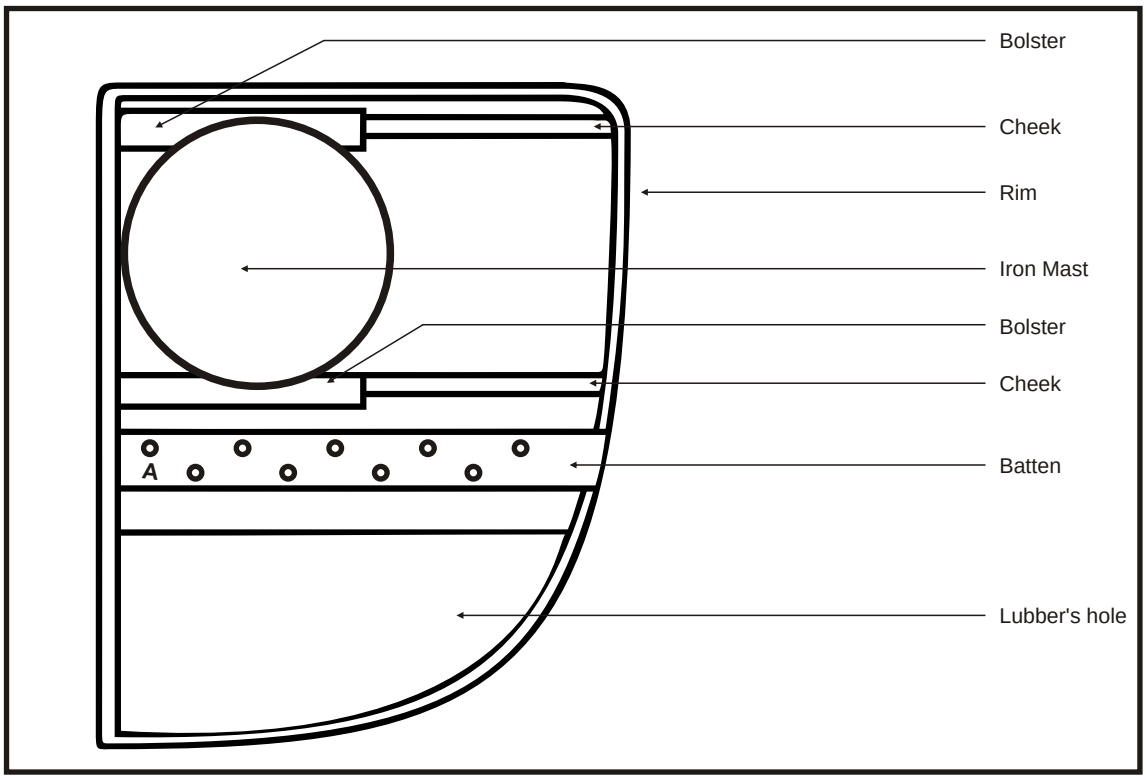


Figure 464: Mast top. Its purpose is to extend and give additional support to the topmost shrouds by a greater angle. It is convenient for extending and managing the small sails and fixing and repairing the rigging (Luce 1891:8). The frame of the top, in the merchant service, was usually open like a grating and made of oak battens which were lighter, cheaper and offered less wind resistence (Steel 1794:11). (Drawing V. Maitland)

Figure 465: Close-up of top of lower main mast top in 2004. (Photo V. Maitland)

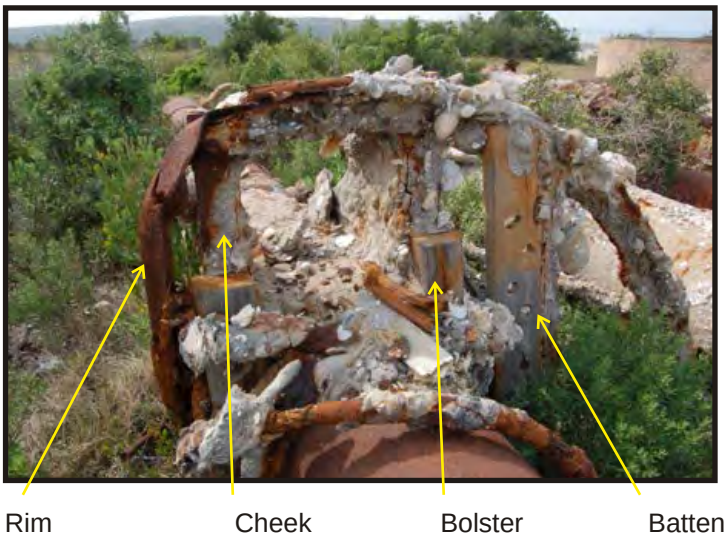


Figure 466: Close-up of top of the lower main mast top in 2007, the marine growth has died and fallen off, revealing the features. (Photo V. Maitland)

Figure 467: Side view of lower main mast top. The struts supporting the top are visible. (Photo V. Maitland)

Figure 468: Carved initial 'A' on the top batten. (Photo V. Maitland) According to Bisset (1958:58), the lookout man was stationed on the forecastlehead or on top of the forward deckhouse. However, he must occasionally have been sent to the mast top.

Figure 469: View of the trunnion hoop of the lower main mast and its parts. (Photo V. Maitland)

Figure 470: Side view of the cap and trunnion hoop. (Photo V. Maitland)

Figure 471: Close-up of an eye on the trunnion hoop for the rigging. Wire cable is still attached. (Photo V. Maitland)

Figure 472: Close-up of the double block attached to the trunnion hoop of the lower main mast. (Photo V. Maitland)

Mizzen Mast

Mizzenmast according to the Lloyds' Survey of 1881		
Length extreme	79' 8"	24.28 m
Diameter at Partners	22½" & 6/16 thick	57.15 cm & 9.52 mm thick
Diameter at Heel	16½" & 5/16	41.9 cm & 7.93 mm
Diameter at Hounds	17½" & 5/16	44.45 cm & 7.93 mm
Diameter at Head	14½" & 5/16	36.83 cm & 7.93 mm
Seams double riveted Butts below partners double Remainder treble riveted straps 1/16 thicker than plates Doubled for 10' 0 at wedging		24.5 cm

Figure 473: Lower mizzen mast, showing the cap, trunnion hoop and top cheeks. Cable is still wrapped around the mast. (Photo V. Maitland)

Figure 474: Another view of the lower mizzen mast. Other pieces of masts are visible. (Photo V. Maitland)

Figure 475: Close-up of cable wrapped around the lower mizzen mast. (Photo V. Maitland)

Figure 476: Close-up of cheeks under the top of the lower mizzen mast. (Photo V. Maitland)

Figure 477: Another view of the cable and cheeks of the lower mizzen mast. (Photo V. Maitland)

Figure 478: Another view of the trunnion hoop of the lower mizzen mast. (Photo V. Maitland)

Figure 479: Cross-section of lower mizzen mast. (Photo V. Maitland)

Figure 480: Close-up of lower mizzen mast cap and trunnion hoop. (Photo V. Maitland)

Bowsprit and Yards

Bowsprit according to the Lloyds' Survey of 1881		
Length extreme	3 y-0	7.74 m
Length outside bed	20'-0	6.09 m
Diameter at bed	26" x 7/16 thick	66.04 cm x 11.11 mm
Diameter at Heel	21" x 6/16	53.34 cm x 9.52 mm thick
Diameter at Cap	16½ x 6/16	41.91 cm x 9.52 mm
Angles	3½ x 3 x 6/16	88.9 x 76.2 x 9.52 mm
Seams double riveted Butts inside of wedging double Remainder treble riveted Doubled at wedging with 6'-0 plate		15.24 cm
Lower Topsail Yard according to the Lloyds' Survey of 1881		
Length extreme	67-6	20.57 m
Diameter at centre	16 x 5/16 thick	40.64 cm x 7.93 mm thick
Diameter at 1st quarter	15 5/8 thick	38.1 cm x 15.87 mm
Diameter at 2nd quarter	14 3/8 thick	35.56 cm x 9.52 mm
Diameter at 3rd quarter	2 x 4/16 thick	5.08 cm x 6.35 mm
Diameter at ends	8' x 3/16 thick	20.32 cm x 4.76 mm
Seams single riveted With treble riveted overlapped Doubled at centre 5'-0		12.7 cm
Loweryard according to the Lloyds' Survey of 1881		
Extreme length	75-6	23.01 m
Diameter at centre	18" x 5/16 thick	45.72 cm x 7.93 mm
Diameter at 1st quarter	17½ x 5/16 thick	44.45 cm x 7.93 mm
Diameter at 2nd quarter	16¼ x 5/16 thick	41.27 cm x 7.93 mm
Diameter at 3rd quarter	13½ x 4/16 thick	34.29 cm x 6.35 mm
Diameter at ends	9 x 3/16 thick	22.86 cm x 4.76 mm
Seams single riveted Butts treble riveted overlapped Doubled at centre 6'-0		15.24 cm

In Figure 31 of the wrecked *County of Pembroke*, the bowsprit is hanging off the stem and in Figure 32, it is lying on the beach. This is why we never recovered any bowsprit pieces except those mentioned in the bow section.

Figure 481 - 482: These round metal pieces, too narrow to be masts, may be yards. (Photos V. Maitland)

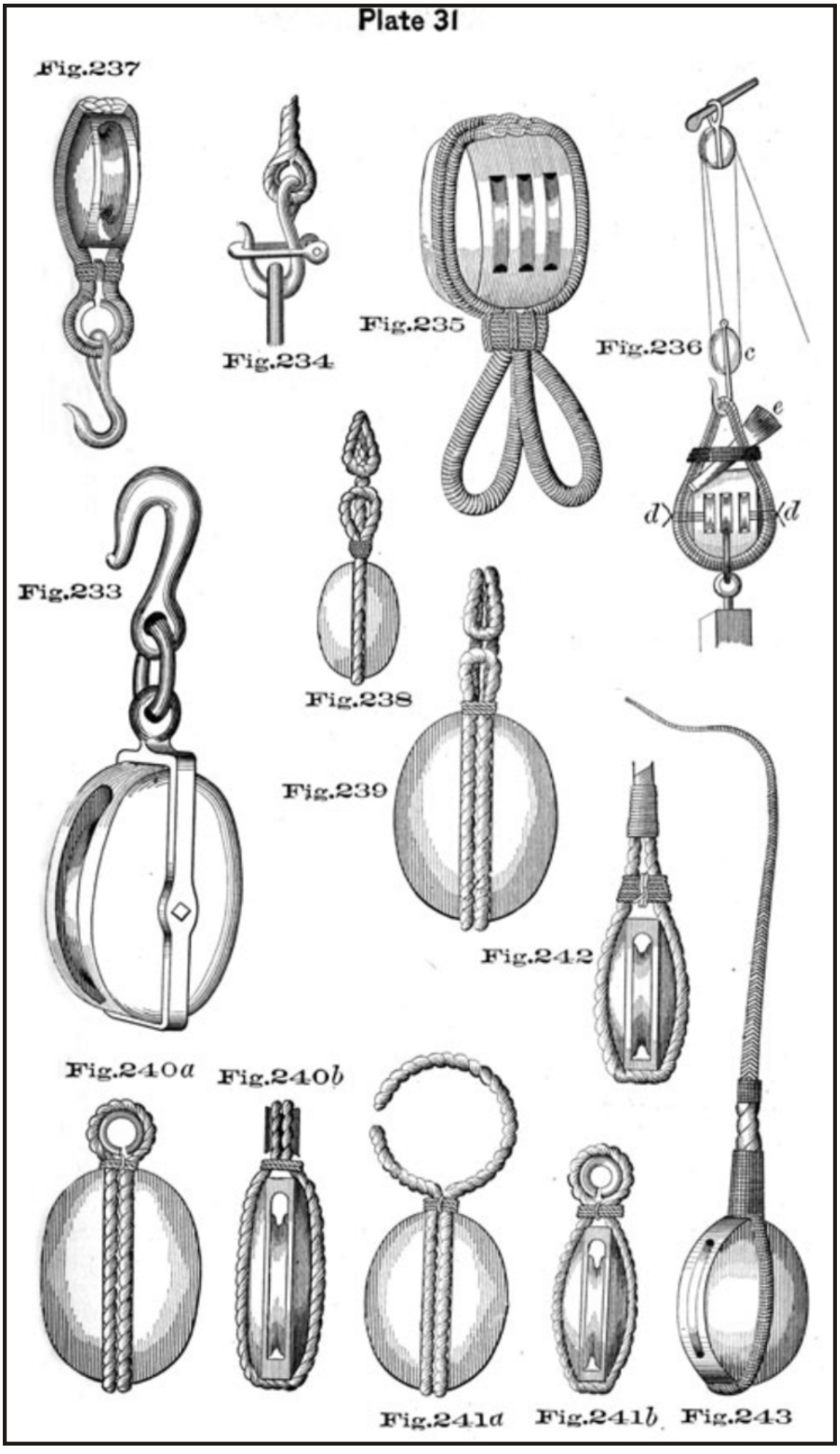


Figure 483: Various types of blocks. (Luce1891:60)

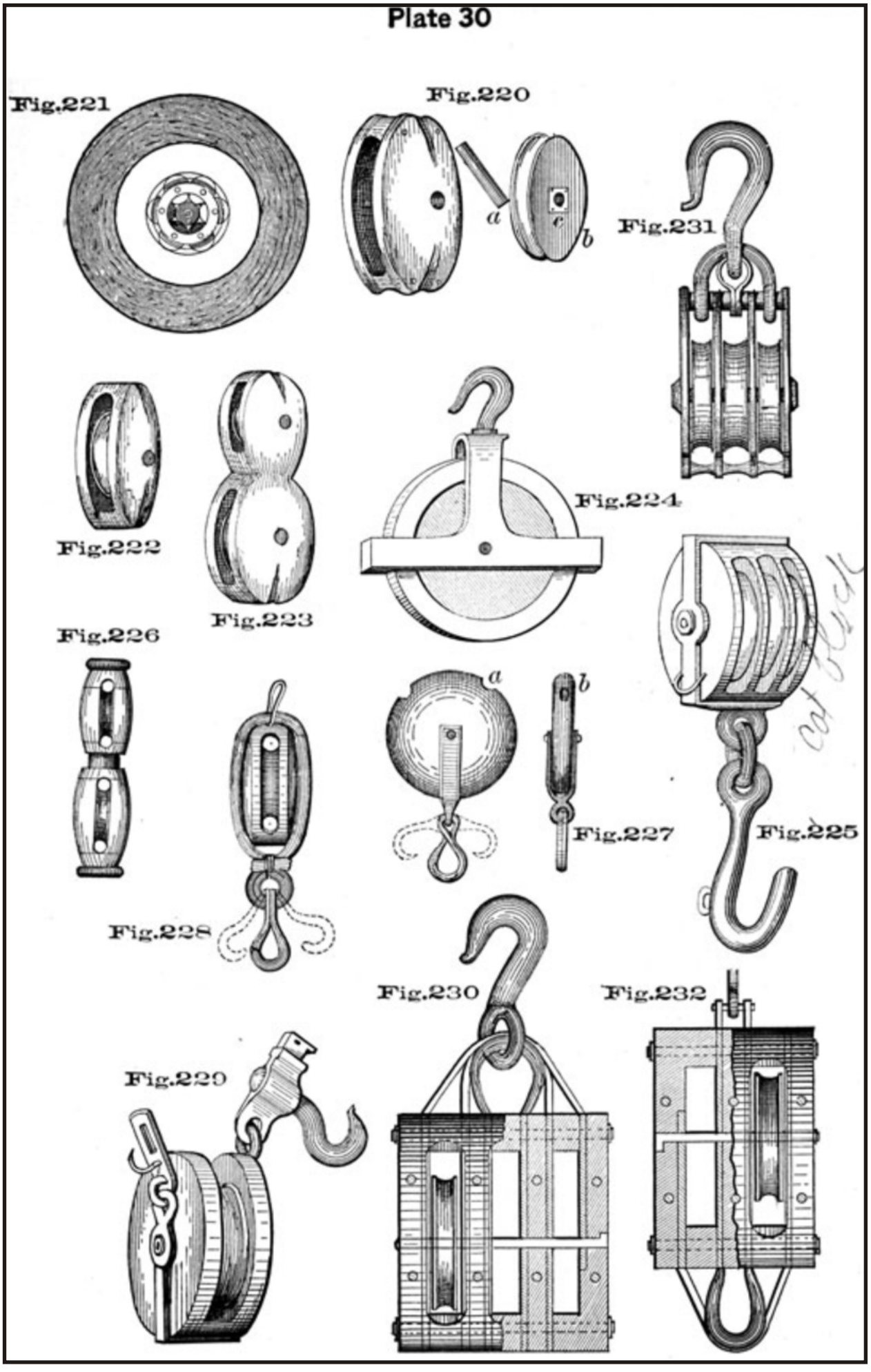


Figure 484: Block parts and block making equipment. (Luce 1891:62)

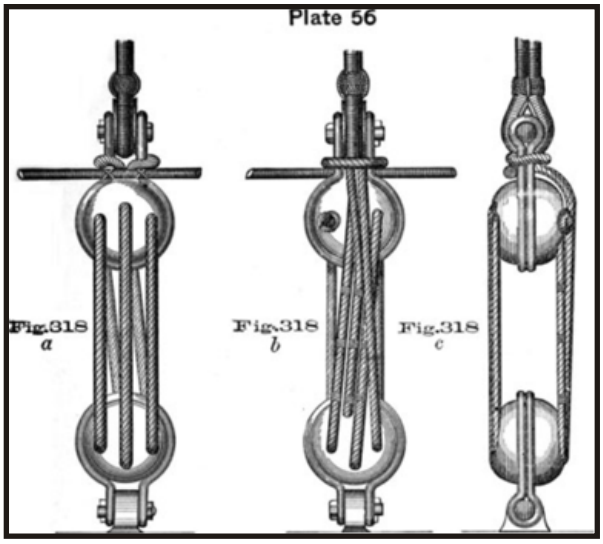


Figure 485: Reeved dead-eyes. A dead-eye is a round, flat, wooden block usually made of elm. It has three holes instead of sheaves through which the lanyards are reeved. The middle of the outside has a groove large enough to receive the shroud or chain plate strop and shackle (Steel 1794:165; Underhill 1938:108).

Figure 486: In-situ dead-eye. (Photo Subtech)

Figure 487: Dead-eyes in the channel on the bulwarks. (Photo V. Maitland)

Figure 488: Dead-eye from the channel. (Photo V. Maitland)

Figure 489: Dead-eye still attached to iron wire rope or standing rigging. (Photo V. Maitland)

Figure 490: Close-up of dead-eye. Iron wire cable is in the groove. (Photo V. Maitland)

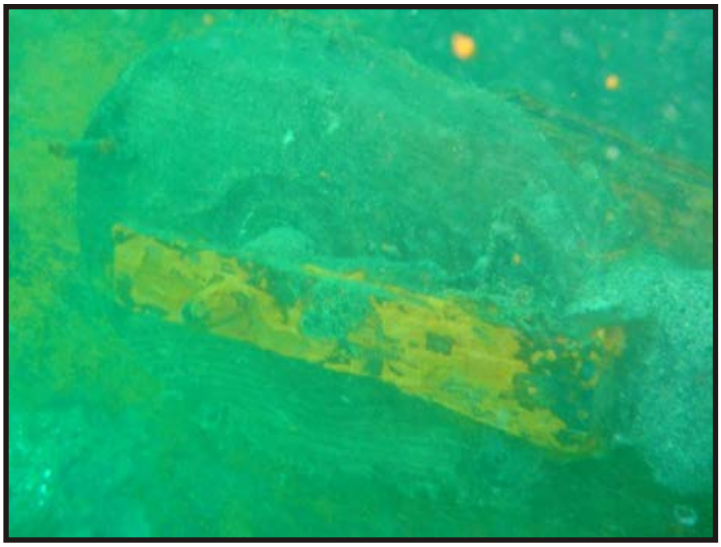



Figure 491 - 492: Two in-situ views of an iron strapped block. It appears the shell has rotted away. (Photo V. Maitland)


Figure 493 - 494: Two views of a large, single, iron-bound block with a fixed hook. The iron strap has disappeared, but its attaching pin and sheave are still largely intact; iron bolts for attaching the strap are also visible. (Luce 1891:66; Photos V. Maitland)

Figure 495: Single, iron strapped block. The hook is shorter and fatter. Unfortunately the conglomerate around the neck of the hook was too thick and I was unable to determine whether the hook could swivel or not. (Photo V. Maitland)

Figure 496: Double, iron strapped block. The large hook appears to hinge onto the iron strap and was probably able to pivot. The iron strap is still in place. (Photo V. Maitland)

Figure 497: Double iron strapped block. (Photo V. Maitland)

Figure 498: Double block that is strapped with wire rope. (Photo V. Maitland)

Figure 499: Side view of the double block and wire rope strap. (Photo V. Maitland)

Figure 500: Single block that was strapped with wire rope. The scores cut at the ends of the shell for the straps are visible and judging from the outlines left by the decayed material, it appears that a securing iron plate was attached over the wire rope strap by the scores. (Photo V. Maitland)

Figure 501: Top view of the scores in the block shell. (Photo V. Maitland)

Figure 502: Sheave from a block. (Photo V. Maitland)