Wreck Inspection Report of the Frances Bay Wreck in Darwin Harbour, NT
5-9 July 2010

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August 2010
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Acknowledgments
This project was supported by a number of individuals and agencies. We would first like to thank Michael Wells and David Steinberg of the NT Heritage Branch for their continuing support and for providing Flinders University's students and staff with the opportunity to conduct research in the NT. Thank you to David particularly for organising the field work, developing and contributing to the methodology and supervising and participating in the field work. Thank you also to Rick Weiss and Sue Sultana of Tek Ventures for providing exceptional equipment and logistical support. Thank you to the NT water police, particularly Glenn McPhee (Macca) and Eric Edgecombe for their above board professionalism and hospitality. Thank you to Ross Anderson and Michael Gregg for providing historical research support at the drop of a hat and Silvano Jung for his initial research on the wreck and his insightful suggestions.

Funds were made available by Department of the Environment, Water, Heritage and the Arts as part of the Northern Territory distribution under the Commonwealth's Historic Shipwrecks Program and the Flinders University Maritime Archaeology Program.

Technical Data
Site Name
Frances Bay Wreck
Dates of Inspection
5-9 July 2010
Personnel
David Steinberg – NT Heritage Branch
Jennifer McKinnon – Flinders University
Jason Raupp – Flinders University
Sam Bell – Flinders University
Matt Hanks – Flinders University
Toni Massey – Flinders University
Sarah Nahabedian – Flinders University
Glenn McPhee – Northern Territory Police
Eric Edgecombe – Northern Territory Police
Location
Located approximately 350 metres (m) southeast of Stokes Hill Wharf in 9-10m of water and approximately 15m west of a mooring buoy and on the east edge off the channel.
GPS (WGS 84)
12 28 040S
130 51 230E
Chart
Approaches to Port Darwin – Aus 26 (22 Aug 2003)

Wreck Site History
The Frances Bay Wreck was first located in August 1996 by “Aussie” Eisenmann, co-skipper of the ferry Darwin Duchess. Eisenmann was diving to free an anchor when he found a propeller and drive shaft. He reported his find to Tom Lewis, a Lieutenant in the Royal Australian Navy and a local maritime historian, who then emailed Paul Clark at the Museums and Art Galleries of the Northern Territory (MAGNT). It was investigated by RAN Dive Team 11 and Lewis in August/September of the same year. The possibility of its identity was proposed by Lewis as the Australian-built Rachel Cohen (1871-1924). Subsequently Lewis wrote articles in Australian Sea Heritage (1997) and Scuba Diver (1997) outlining evidence for this identification.
Artefacts were recovered by the RAN team for possible identification. These items included a beer bottle marked Northern Bottle Company, a piece of rubber fan belt, a porthole and a deck light. Also noted but not removed were a battery, tires, a mooring block, "an iron" and dish drainer. The artefacts recovered from the site were not handed over to MAGNT and their location and condition is currently unknown.

Alarmed at the removal of artefacts, Clark recommended that the site be given an "Interim Conservation Order" (ICO) under the Heritage Conservation Act so that the site would be protected from "bashing" or looting. Lewis took the recommendation on board and advised the original finder not to take any items or divulge the location to anyone. Further, he began the process of seeking an ICO. Plans for the order did not proceed at a reasonable rate and Clark inquired at the Heritage Branch as to why an ICO had not yet been issued. Delays were a result of Lewis not providing a latitude and longitude for the site's location, which is necessary for the Order. It took several emails and many months to receive an approximate location from Lewis which was finally communicated via email on 30 September 1997. Accordingly, the approximate wreck site, "Darwin Harbour unidentified shipwreck No. 1," was added to the NT shipwreck database maintained by MAGNT. Unfortunately, the position supplied by Lewis was inaccurate, and as a result, no archaeological investigation or survey was conducted (Steinberg 2010, personal communication).

In June 2009, Rick Weisse and Sue Sultana of Tek Ventures Diving Services (Tek Ventures) relocated the wreck during a side scan sonar inspection of the area (Figure 1). Tek Ventures conducted a dive on the site to identify the anomaly. Subsequently Tek Ventures nominated the wreck to the NT Heritage Register and the NT Heritage Branch formally notified DEWHA because it lies within the jurisdiction of the Commonwealth Act.

![Figure 1. Side scan sonar image of Frances Bay wreck. Courtesy Tek Ventures.](image-url)
A joint project was organised between the Heritage Branch of the NT Government and Flinders University to archaeologically investigate the site further. This project took place 5-9 July 2010. The NT Police, Marine and Fisheries Enforcement Section provided the Police boat PPV *Beagle Gulf* as a dive operations platform, while Rick Weisse and Sue Sultana of Tek Ventures provided necessary equipment and logistical support.

**Site Conditions on Assessment**
The site was visited during the July neap tide, a period of especially weak tides which allows for improved visibility in the harbour. Though high winds and rain caused extremely low visibility on one day, visibility generally ranged from .5m to 2.5m. Swell and surge were nearly non-existent on site. Every opportunity was taken to dive before and after slack tide so that disturbed sediment would be transported away from the site with tidal movement. However, due to the short duration of the project dives were conducted as frequently as was safely possible. A total of 55 dives were conducted for a total of 3017 minutes (50.28 hours) on site.

**General Description of Site**
The wreck site lies in 9-10m of water southeast of Stokes Hill Wharf. Approximately 350m from shore, the wreck is located just east of the channel nearby a private mooring (Figure 2). The wreck scatter measures approximately 30m long by 10m wide and is largely buried in a muddy, silty substrate which protects the fragile wooden structure. Major features include a partially exposed large section of wooden hull structure (frames and planking), the main engine, shaft and propeller, a possible ballast pile, a large deck winch and two large water tanks. Other medium and small features include a possible auxiliary engine, chain, deck lights, copper alloy sheathing, metal fasteners and shipboard items (Figure 3).

![Figure 2. Buoy marking Frances Bay wreck just off shore Stokes Hill (Flinders University).](image-url)
Frances Bay Wreck
Darwin Harbour, NT
July 2010

Figure 3. Frances Bay Wreck site plan (Drawn by S. Bell, M. Hanks, T. Massey, J. McKinnon, S. Nahabedian, J. Raupp and D. Steinberg).
The wreck site is colonized by a variety of flora and fauna (Figure 4). Visible timbers show evidence of wood boring molluscs. Echinoderms can be found within small crevices on the wreck. Sponges, macro algae, bryozoans, cnidarians and hard corals can be found on the more solid structures including the engine and water tanks.

Notable fish species on the site include, but are not limited to:

- *Ceratosoma* spp.- Orange nudibranch species
- Family Teredinidae- Shipworms, teredos
- *Leviprora inops* - Long-headed flathead (similar to crocodile fish)
- Family Tetraodontidae- Toadfishes, pufferfishes
- Family Chaetodontidae- Butterflyfishes
- Family Gobiidae- Gobies
- Family Synodontidae- Lizard Fishes

![Figure 4. Clockwise from top left: Scleractinia sp., Gorgonacea sp., Gorgonacea sp., *Leviprora inops*, Tetraodontidae sp., and *Ceratosoma* sp. (Flinders University).](image-url)
Survey, Recording and Samples

Baseline Offset Survey

Baseline offset survey was the preferred method for recording the wreck due to the condensed nature of the site. A baseline was laid along the length of the engine shaft with the zero end just north of the propeller and an end secured south at approximately 36m. The baseline was emplaced using two star pickets which were left in place on the site for future datum references. The baseline was oriented at 60 degrees splitting the site roughly on a Northwest (NW) / Southeast (SE) orientation. Initially it was thought that the baseline was nearly in line with the keel of the ship based on the engine position and that the NW side equalled roughly the port side and the SE side of the baseline was the vessel's starboard side. However this turned out to be false as the engine has fallen onto the starboard side of the vessel and the keel is oriented more along a line of 50 degrees. For the purposes of this report, the site will be discussed in terms of the NW (left) and SE (right) sides of the baseline.

Once the baseline was set it was used to take 90 degree offset measurements to structures on both the NW and SE sides. The site was dissected into manageable sections for baseline offset measurements (0-12m, 12-24m, 24-36m). Varying teams mapped the NW and SE portions of their section of the baseline.

Probe Survey

A probe survey was conducted near the stern of the wreck site in an effort to identify hull sections, large artefacts or a possible second engine that may be buried under the silt. Probes were placed on both the NW and SE sides of the baseline at a 90 degree angle from the starting point near the intact engine (8.4m along the baseline). At one metre intervals a rod was sunk into the silt to test for anomalies. Where a hard return was encountered, the location and depth of the feature was recorded and a visual search of the area was conducted to identify any objects on or protruding from the seafloor. The maximum length of the probe was 1.2m; while it is possible that the remains might be buried deeper, it is unlikely.

The survey identified few positive returns. On the NW side of the baseline only one positive probe was noted; this was the initial probe (1m from the baseline) and was determined to be a small, partially buried and unidentified object. Probes on the SE side of the baseline provided positive returns. These included a metal object at 1m, buried approximately 10cm and associated with scattered metal surface debris; a metal object at 2m, buried approximately 5cm and associated with scattered metal surface debris; a metal object on the surface at 3m; a small, wooden object buried approximately 10cm and likely a piece of ceiling planking that was also noted on the surface nearby at 4m; a small, metal object at 8m, buried approximately 20cm and likely associated with scattered metal surface debris at 5m; and a small, metal object at 10cm buried approximately 20cm at 6m.

Excavation

A 2m grid was emplaced adjacent to the baseline from 15-17m on its NW side. This location was chosen because it provided the most visible hull structure on site. The 2m grid was hand-fanned to remove all sediment (<10cm deep) and expose the wooden structure, then mapped in 1m grid sections.

Additionally, some hand-fanning of specific features was conducted in other areas of the site. These areas included sections of the keel assembly approximately 4-12m along the baseline on the NW side and a large wooden object initially identified as a possible rudder directly on the baseline at 24m.

Photography and Videography

Since visibility is challenging in Darwin Harbour, every attempt was made to photograph during periods of high visibility. Photographs were taken of the major features of the site as
well as smaller objects. Additionally, video was taken of the site. Transects were swam along the baseline and video was also taken of selected large and small features.

**Timber Samples**

Timber samples provide useful information concerning choices and availability of wood and possibly origins of construction. Only one useable sample was recovered due to the condition of the wood as a result of wood-boring organisms. Unfortunately it is difficult to determine if a section of timber has succumbed to wood-boring organisms without cutting into it. Thus three samples were attempted and only one was substantial enough to submit for identification. The samples were taken using a handsaw, chisel and hammer and measured approximately 20 x 20cm. The useable sample was recovered from a frame at 10.3m along the baseline and .4m on the NW side of the baseline (Figure 5). The two other samples attempted on the keel were taken at 10.8m along the baseline and 1m on the NW side of the baseline and 7m along the baseline and .4m on the NW side of the baseline.

![Figure 5. Cut marks of timber sample in keel prior to removal (Flinders University).](image_url)

The sample was sent to Jugo Ilic of *Know Your Wood* in Victoria for identification. Using microscopic analysis of the wood structure Ilic determined the specimen to be "*Eucalyptus acmenoides*" (White mahogany). Ilic communicated that it was difficult to identify the specimen based on colour since the wood was dark in nature. He suggested this may have been a result of burning.

**Site Components and Artefacts**

The Frances Bay Wreck site consists of both wooden remains and copper sheathing of the vessel structure, as well as metal remains of mechanical components of the vessel's propulsion and lifting equipment, components of its provisions storage and structural components of the rigging. A small number of artefacts associated with the vessel's daily operations and provisions were also identified. Many other objects were noted on the seabed; however they were unidentifiable due to corrosion. The following is a discussion of those objects that were identified either by type or possible function; it has been grouped into categories including major structural elements, minor structural elements, fixtures and fittings, and cargo and contents.
Major Structural Elements

Hull Remains
A large portion of hull remains are lying exposed on the seabed and likely extend further into the muddy, silty sediments. The major portion of hull structure includes three section of exposed keel and one large area of frames and hull planking. Other disarticulated and burned timbers were scattered throughout the site on the surface. Most of these timbers were left unidentified and the focus for mapping was in the areas of exposed framing and hull planking (Figure 6).

As noted above, the engine does not run the length of the keel and appears to have fallen over to the starboard side of the vessel. A large portion of the keel is exposed just to the NW of the engine and shaft at 5-12m and heads in a general direction of 50 degrees. It surfaces again from 14-17.5m where a substantial section of the starboard hull structure is still in situ. Again, the keel is covered in sediment and reappears on the surface between 25-33m.

The section of exposed frame and hull planking was hand fanned and mapped using a pre-constructed 2m grid frame. This section included a substantial portion of in situ hull planking, double framing and ceiling planking. Several loose pieces of copper alloy sheathing and burnt timber fragments were scattered within the area (Figure 7). Due to low visibility and a lack of adequate time, little information was collected regarding fasteners and fastener patterns.

The hull structure appears to have been subjected to burning at some point as many disarticulated pieces of burnt timbers were scattered about the surface of the seabed (Figure 8). Further evidence of this is provided by wood specialist Ilic, who suggested the wood sample appeared burned.

<table>
<thead>
<tr>
<th>Table 1. Scantling measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Element</strong></td>
</tr>
<tr>
<td>Keel</td>
</tr>
<tr>
<td>Ceiling planking</td>
</tr>
<tr>
<td>Frame</td>
</tr>
</tbody>
</table>
Space between frame pairs | 300-350mm
---|---
Space between frames in pair | 60mm

Figure 7. Two metre grid square detail (Drawn by D. Steinberg and T. Massey).

Figure 8. In situ charred frame end, 20cm scale (Heritage Branch NT Government).
Figure 9. Frances Bay Wreck site plan with hull structure highlighted (Drawn by S. Bell, M. Hanks, T. Massey, J. McKinnon, S. Nahabedian, J. Raupp and D. Steinberg)
**Wooden composite feature**

What was initially identified as a possible section of rudder is located along the baseline between 24.5 and 27m (Figure 10). Roughly 2.5m in length and 1m in width, the feature is a composite structure of wood planks and sheathing. Roughly shaped like a rudder, one side is flat and the other edge is curved. A steel spindle-like object is located protruding from the flat side. The side of the feature facing the surface is completely sheathed in copper alloy although some of the sheathing has been stripped off. An attempt was made to determine if sheathing existed on the other side of the object, but was inconclusive. Additionally, the feature demonstrated a remarkable amount of burning both on the surface and beneath the sheathing.

It is unlikely that this is a rudder because of its small size. However, the structure was meant to be submerged in water as it was copper alloy sheathed at least on one side. Possibilities for other interpretations include a section of centreboard or a leeboard.

![Composite Wooden Feature](image)

**Figure 10.** Composite wooden feature detail (Drawn by Sam Bell).

**Main engine, propeller and shaft**

An intact engine with connected shaft assembly and propeller were documented on the wreck site (Figure 11). Preliminary research indicates that it is a one cylinder “hot-bulb” or “semi-diesel” engine. The hot bulb engine, or heavy oil engine, is a type of internal combustion engine in which fuel is ignited by being brought into contact with a red hot metal surface inside a bulb. Most hot bulb engines were produced as one-cylinder, low-speed, two-stroke crankcase scavenging units (http://www.blurbwire.com/topics/Hot_bulb_engine).

Perfected by Herbert Akroyd Stuart at the end of the 19th century, production of hot bulb engines began in 1891 by Richard Hornsby & Sons of Grantham, Lincolnshire, England under the title Hornsby Akroyd Patent Oil Engine. Versions were later developed in the USA and Sweden for agricultural and marine use and hot bulb engines were built by a large number of manufacturers in Europe and the USA (Figure 12). The main feature of the hot-bulb engine is the vaporiser or hot-bulb, a chamber usually cast into the engine block and attached to the main cylinder by a narrow opening. Prior to starting the engine when cold,
this vaporiser is heated externally by a blow-lamp or slow-burning wick for as much as half an hour. The engine was then turned over, usually by hand but sometimes by compressed air or an electric motor. At the time of development, its great attractions were its economy, simplicity, safety, range of fuel compatibility and ease of operation in comparison to the steam engine (http://www.blurbwire.com/topics/Hot_bulb_engine).

Figure 11. Frances Bay Wreck engine.

From around 1910 the diesel engine was improved dramatically, with more power being available at greater efficiencies. Diesel engines offered greater power for a given engine size due to the more efficient combustion method (they had no hot-bulb, instead relying purely on compression-ignition) and greater ease of use as they required no pre-heating (http://www.blurbwire.com/topics/Hot_bulb_engine).

Figure 12. Historic illustration of a single cylinder hot-bulb engine manufactured by Swedish company Bolinder (http://www.oldengine.org/members/diesel/marine/bolinder.htm).
The engine block is lying over onto the starboard side of the wreck; it is approximately 3m long and has a 12cm wide frame that is bolted to a wooden bed. Due to both low visibility and corrosion, no markings and few features were discernable. Those that were include a 105cm diameter and 25cm thick flywheel with a 30cm diameter hub at its centre through which it was connected to the engine using a 15cm diameter bolt; a single engine cylinder measuring 150cm tall and 50cm in diameter and a 35cm tall and 35cm wide cylinder head. Aft of the engine cylinder are several rounded sections (ranging 15 to 45cm wide) that likely serve as guards for gears rotating inside them.

Lying on the seabed around the engine are sections of copper tubing (thought to be associated with its operation), unidentified pieces of metal plates and other undetermined objects. The largest of these rests next to the engine cylinder and is a rounded tank measuring 145cm long and 50cm in diameter with flat ends. At its centre is an unattached flange which consists of a 12cm diameter intake tube ringed by a 9cm wide skirt. The function of this object is unknown, however it is considered to be a fuel tank.

Connected to the main engine is a propeller shaft measuring 25cm in diameter and approximately 7cm long. The shaft is composed of two sections which are attached to the engine and coupled together via 40cm diameter flange joints. A 50cm long and 40cm diameter sleeve on the shaft was also noted; however its function is unknown. A three-bladed, cast bronze or brass screw propeller is connected to the aft end of the shaft (Figure 13). It measures approximately 115cm in metre in diameter and each blade is 50cm in length, 32cm at its widest point; the hub 17cm in diameter. No markings were identified on the propeller blades or hub.

Figure 13. Three-blade propeller (note baseline on left), 10cm scale increments (Heritage Branch NT Government).
Minor Structural Elements

Auxiliary engine
A small section of an auxiliary engine was also noted on the site. This is resting in a pile of other objects and is almost completely buried in silt. The flywheel and base of the engine block were identified and some measurements were recorded. The flywheel was too deeply buried to determine its diameter; however it is approximately 7cm thick and has a grooved external face. The exposed portion of the bottom of the engine block is 40cm wide and 55cm long before running into the silt; it has four square indentations which give a grate-like appearance. While the purpose of this particular engine is unknown, auxiliary engines were used for many different purposes on ships including running generators, charging batteries and operating deck machinery (Jubbs, 1997:88).

Possible water tanks
Two large, square tanks were recorded on the wreck site (Figure 14). These average 180cm long x 112cm wide x 1 metre tall; based on these dimensions the tanks had an average volume of 545 gallons or 2066 litres. The ship tank was invented in 1808 and over the years came in a variety of shapes and sizes (Pearson, 1992:24). The function of these tanks is unknown; though it is likely they were either used to store fresh water or engine fuel. Based on their scattered locations on the site it seems likely that both of these were displaced either in the wrecking event, through the deterioration of the vessel or through salvage operations.

Figure 14. A section of one of the large tanks on site, 10cm scale increments (Heritage Branch NT Government).

Deck winch
A large deck winch is located on the SE side of the baseline (Figure 15). Deck winches were used to assist in sail handling and hauling cargo and became common on sailing vessels after the 1890s (Baker, 1982). This winch measures approximately 220cm in length and
discernable features of the winch include two warping heads (35cm in diameter), the winch drum (35cm in diameter), the main cogwheel (75cm in diameter) and the pinion shaft cogwheel (80cm in diameter).

Figure 15. A warping head of the large deck winch (Heritage Branch NT Government).

Possible small winch
A possible winch was identified in the stern section near the propeller. This consisted of a two-sided frame with a central drum that was 60 cm wide and approximately 15cm in diameter. Winches of this size were known as “crab winches” and were simply reels used on many vessels for whatever lifting jobs were needed (Stone, 1982: 46).

Possible windlass section
An odd shaped artefact recorded in the forward part of the wreck on NW side of the baseline has been tentatively interpreted as part of a windlass. By the end of the nineteenth century most ships would have been equipped with a windlass, which were generally used to assist in raising and controlling anchors and chain. This piece is round and may be part of a windlass drum. It is constructed of iron or steel and has six interconnected sections. The lowest section is a smooth cylinder and measures 20cm long and 50cm in diameter; the next section is 32cm long and 50cm in diameter and appears to be a “cage” made of alternating metal bars and 10cm wide open spaces; the next is another smooth section 20cm long and 60 cm in diameter; the next is 10cm long and 60cm and is another “cage” with alternating metal bars and 10cm wide open spaces; next is small band 10cm long and 25cm in diameter; and at the end is a small cap 14 cm long and 10cm in diameter that might have had a head connected to it.
Fixtures and Fittings

Ventilator
A single ventilator was identified near the large winch forward of the engine. The distinctive large mouthed shape of the cowl on these allowed for fresh air to be caught above deck level and directed into the spaces in the hull through a pipe. During foul weather the cowl was removed and a plug was inserted into the hole in the deck (Stone, 1993:53). Though in most cases the sheet metal from which they are made does not last long, this object appears to be in good condition and has the brass ring still attached. It measures 135cm in length, 25cm in diameter near the base and the cowl is 30cm wide with a 55cm opening at the mouth. The ring at the base of the vent is 32cm in diameter, 5cm deep and has a 4cm skirt for fastening to the deck. Ventilators are thought to have come late to sailing ships, but were common by the turn of the century (Stone, 1993:53).

Mast/bowsprit assembly and iron "ladder" piece
A possible rigging assembly was noted near the forward end of the site. This piece consists of several interconnected parts. These include an iron or steel band configured with a 25cm diameter hoop and a 20cm diameter hoop connected together and to a 1m long steel strap on its forward end and at its aft end is a 2m long steel strap (which has a 90° bend at 1.4m). To this aft piece is connected 2.8m of stud link chain (8cm x 5cm links), which is attached to an approximately 1m long steel or iron strap and a 3m long section of 3cm diameter wire cable. The wire cable section is buried in the middle, but is attached at its end to a ladder like object. This is 90cm long, 50cm wide at the top, 30cm wide at its bottom and has four fasteners connecting its sides at irregular intervals; it is considered to be a frame that would have slipped over a piece of wood and been attached by the fasteners. Some shorter sections of wire cable (1 to 1.5 m pieces) are lying next to the chain; it is not known whether these are connected to or directly associated with the assembly.

Based on preliminary data this assembly is considered to have been associated with the bowsprit or a top mast. The band piece is thought to be a “cap” piece, which was used to connect two pieces of timber of different sizes by slinging the larger hoop over the forward end of one piece and the smaller hoop over the aft end of another, thereby connecting the two to make one long timber piece (Baker, 1982: 116-117). Cap pieces were commonly used on sailing vessels to extend the length of bowsprits and the heights of topmasts, and to them were attached standing rigging, such as stays made of chain and wire or rope sections, which were in turn connected to parts of the ship. The invention of stud link chain occurred in 1812 and was patented by Thomas Brunton of London in 1813 (Baldt 2010).

Chain
Two small sections of chain were found at the forward end of the site. One of these is attached to the rigging assembly and is discussed above; the other was unattached and located near the forward edge of the hull remains on the NW side of the baseline. This section was approximately one metre long and consisted of several 12cm x 10cm links; due to the corroded state it was not possible to determine whether they were stud links.

Wire cable
Sections of 3cm diameter wire cable was noted in two areas of the site. An 88cm diameter spool of wire was noted lying on the SE side of the baseline in the midships area and several pieces (ranging from one to three metres long) were attached to a rigging assembly near the bow (discussed above). Wire rope replaced the use of hemp rope for rigging; its smaller diameter reduced wind resistance and its durability reduced overall costs. It was commonplace on most vessels by the 1870s and reduced the top-hamper weight, allowing the use of taller masts and larger sails (Burns, 2003: 49; Murphy, 1993:265; Wallace, 1927:157).

Deck Light
A deck light was identified lying on the seabed in the forward section of the wreck (Figure 16). Since the open flame of a lamp or lantern was a fire hazard on any wooden vessel, natural lighting had to be utilized to illuminate the holds (Burns, 2003:60). Common on merchant vessels after the 1850s, deck lights were made from thick pieces of glass that were placed into holes on the deck and held in place by a metal or wooden frame and sealed with cement, making the assemblage watertight (Quinn, 1997:142; Burns, 2003:60-61). This light has a rectangular top and elongated, inverted pyramidal base and measures approximately 24cm long, 10cm wide and 5cm tall; a 4cm chip is missing from its base and a corner is missing from its top.

Figure 16. Glass deck light, 20cm scale (Heritage Branch NT Government).

Lead frame
A small lead frame was found in the aft section of the site near the skylight piece (Figure 17). This piece measured approximately 25cm long by 10cm wide overall. Its rim is 2cm wide and is perforated with several 1cm diameter holes. This frame is thought to have been used to attach the deck light (discussed above) to the deck.

Skylight panel
A skylight panel was located in the aft section of the site (Figure 18). This panel consists of a metal frame measuring 35cm long, 20cm wide and had a 5cm wide rim. Inside the frame are three glass panes, each measuring approximately 10cm² and exhibiting a smooth surface on the outside and a grooved surface on the inside. This would have been one of many panels that would have sat in the larger frame of a skylight hatch coaming, which would have allowed natural light to penetrate the interior of a cabin.
Figure 17. Small lead frame, 20cm scale (Heritage Branch NT Government).

Figure 18. Skylight panel, 20cm scale (Heritage Branch NT Government).
Door knob and lock assembly
A door lock assembly was also found in the aft section of the wreck (Figure 19). This piece consists of a rectangular lock housing measuring 13cm long and 8cm wide and a brass door knob 5cm in diameter. Instead of a keyway, this assembly utilized a small switch which was found under the left side of the knob near the bottom; this discovery indicates that this is the interior piece of the lock assembly. It is possible that this lock mechanism was attached to the door of the cabin that was illuminated by the skylight nearby.

Figure 19. Door knob and lock assembly, 10cm scale increments (Heritage Branch NT Government).

Sheathing
A considerable amount of copper alloy sheathing is present and scattered throughout the surface of the site, as well as intact and attached portions on the hull planking (Figure 20). The sheathing was fastened using copper alloy tacks and the holes where these tacks were placed are still visible. No maker's marks or stamps were located on the sheathing and no samples were recovered. It is unclear what the composition of the metal sheathing is, however some copper is evident from the patination.

Cargo and Contents
Possible ballast
A small amount of possible ballast was also noted on the site. Ballast was weight added to the bottom of a ship to make it more stable (Stone, 1993:14). While small river rocks or pig iron bars were the preferred ballast materials for sailing ships, nearly anything would work. This possible ballast consisted of a pile of unclassified rocks averaging 20cm x 30cm and located forward of the engine. Though it is possible that this pile represents the ship's ballast, it could also have been dumped by another vessel and therefore its association with the wreck is uncertain.
Possible blow lamp
An unidentified copper alloy artefact was recorded near the engine. This piece consists of a 15cm tall and 10cm diameter canister with a 2cm diameter tube connected to one side of it. The tube is broken and only approximately 12cm long. The canister is completely intact and has a 3cm hole cut into one end; this was likely where it was filled. No markings were discernable on this object. Upon initial inspection it was thought to be a pump-action pesticide sprayer of a type that was common in the early to mid-twentieth century. A more likely function is as a blow lamp used for heating the metal surface of a hot-bulb engine (Figure 21). Figure 22 shows an example of an early twentieth century blow lamp.

Bottles
Two bottles were found on the site. One was located within the 2m excavation grid. Another wine bottle was also found and appeared to be a blown glass bottle, green in colour and exhibiting a punt (also known as a kick up) and an applied lip. Preliminary shape analysis indicates a "Bordeaux" type wine bottle, which originated in Europe by the early to mid-nineteenth century (http://www.sha.org/bottle/wine.htm).

Possible lantern lid
A possible lantern lid was identified near the aft part of the engine. This is a 10cm diameter copper alloy, bowl-shaped piece with a 5cm hole in its centre and a single decorative groove just above a 1cm tall lip at it base. Though the exact function of this object is unknown; it is likely that it would have fit inside of an open canister and formed a lid.
Figure 21. Possible blow lamp, 10cm scale increments (Heritage Branch NT Government).

Figure 22. Antique Max Sievert brass blow lamp (http://www.amazon.co.uk/Antique-Max-Sievert-brass-blow/dp/B000VJARTY).

**Gimballed object**

A small copper alloy gimballed assembly was found in the after section of the wreck (Figure 23). This piece consists of a 5cm copper alloy wire bent in a U shape (with 8cm side pieces with small loops bent into the end of either side and 12cm centre section that includes a 4cm loop bent into it) and a 9cm diameter ring. The wire is attached to the remains of a copper
alloy cup beneath it. The function of this object is unknown; however one possibility is that it was part of a lantern.

Possible lid with scallop decorations
A decorated, copper alloy lid was found lying next to the gimballed cup described above (Figure 23). This piece is conical in shape and exhibits a series of grooves running around it, giving it a scalloped appearance. It has a lip at its base that measures 1cm tall and 8cm in diameter; this would likely have fit inside an open canister and formed a lid. Based on its construction material and proximity to the gimballed cup, it is likely the two pieces formed a set.

Possible marlinspike
A small carved, wooden object was found near the ventilator on the site (Figure 24). This conical piece is pointed at one end and is broken at the other. It is approximately 15cm long, 2cm in diameter at its broken end and has been preliminarily identified as a possible marlinspike or sailor’s fid. It is an extremely delicate artefact and evidence of wood boring organisms was noted.

Intrusive artefacts
Several intrusive artefacts not associated with the wreck were also noted on the site. These include sections of rubber matting, beer cans and bottles, cloth and plastic. These items were deposited over time through a number of ways, including storm activity and rubbish disposal.
Site Formation

Overall the wreck site is somewhat contained in an area roughly 15m x 36m and appears to be a substantial portion of the starboard side of a vessel. There is much evidence to suggest that the vessel was burned at some point, either causing its sinking or during later salvage operations. Often wooden vessels are burned to the waterline so that their below deck contents can be salvaged or fasteners can be removed for reuse. Regardless of why it burned, the vessel settled on the seabed and listed to its starboard side after wrecking. Most of the major superstructure features (winch, auxiliary engine, etc.) fell to the starboard as well. The engine block and propeller shaft also have fallen to starboard. Many of the artefacts have remained in context in relation to where on board the vessel they would have been located. This indicates that little natural or cultural disturbance has taken place over time with the exception of wood deterioration. Because the vessel settled to its starboard, most of the port side of the vessel was unprotected by the anaerobic environment provided to the starboard site and has thus been consumed by both wood-boring organisms and wood rot (bacteria). There remains a possibility that some of the port structure is buried deeply below the sediment, but only a systematic probing survey will reveal if this is the case.

Site Condition and Integrity

A very large portion of the hull timbers remain intact and partially buried suggesting that the condition and integrity of the site very good. It is quite remarkable for a wooden wreck to be so well preserved in tropical waters, where marine organisms commonly consume ship remains. Additionally, the fact that portable objects such as door handles and skylights are still present and in situ in terms of intra-site context (i.e. location on the seabed relates to their original placement on the ship) indicates that the site has not been regularly dived or
looted. This is likely due to the very low visibility of the water during the majority of the year and the lack of information about the shipwreck’s position.

As long as the sediment levels do not change, for example as a result of dredging in the nearby channel or from major tidal or storm activities, the site should remain protected by its depositional environment. Further, if the location of the site is not promoted and legislation and funding is sought to protect it, the integrity of the site should remain intact.

Possible Historic Identification
Certain vessel characteristics indicate a time range for the ship’s construction and use. It is possible that the ship was constructed as a sailing vessel originally and later converted to an auxiliary craft with the addition of an engine; however an engine could also have been fitted at the time of construction to be used as an auxiliary means of power. Based on the estimated size of the (approximately 30m long) vessel it is likely to have been a schooner, bark or brig; it is doubtful that it was a smaller cutter, ketch or lugger, which were commonly used in this region and around the Australian coastline. Timber identification suggests that the vessel was Australian-built. If this were the case, the construction of wooden vessels in Australia would place this vessel as being built in the nineteenth to early twentieth century. An initial identification of the engine as a hot-bulb engine places the sinking post-1891 and more likely at the turn-of-the-century or even later.

Records of known shipwrecks including the Australian Shipwreck Database, Submerged Material Culture in the Beagle Gulf Marine Park, Northern Territory: Gazetteer of Sites (Clark and Jung 1995) and the Encyclopaedia of Australian Shipwrecks were reviewed to identify wooden vessels that sank in Darwin Harbour post-1891. Appendix 1 is a list of all known wooden shipwrecks that sank in Darwin Harbour post-1891. Vessels that were smaller than 90ft in length were eliminated; these included cutters, luggers and ketches. Additionally, non-wooden vessels were omitted from the list. The following is a table of the vessels which fit the archaeological remains and others that have little to no detail which could not be ruled out as possibilities. Following the list is a discussion of these possibilities in order of probability from least probable to most probable.
<table>
<thead>
<tr>
<th>Ship name</th>
<th>Flowerdale</th>
<th>Rachel Cohen</th>
<th>Huddersfield</th>
<th>Coral</th>
<th>Betty Joan</th>
<th>Chinta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rig/Type</td>
<td>Schooner/Bn</td>
<td>Schooner</td>
<td>Schooner/ Barkentine</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Yacht</td>
</tr>
<tr>
<td>Tonnage</td>
<td>113</td>
<td>171</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>99.3</td>
<td>105.5ft</td>
<td>107.3ft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breadth</td>
<td>21.8</td>
<td>21ft</td>
<td>27ft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>8.2</td>
<td>10.4ft</td>
<td>8.8ft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Builder</td>
<td>Alexander Newton</td>
<td>J. Dent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place built</td>
<td>Wynyard, TAS</td>
<td>Manning River, NSW</td>
<td>Jervis Bay, NSW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Wooden</td>
<td>Wooden</td>
<td>Wooden, spotted gum; decking = beechwood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date Const.</td>
<td>1878</td>
<td>1871</td>
<td>1919</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location lost</td>
<td>Burnt Govt dock, dragged to Stokes Hill</td>
<td>Frances Bay</td>
<td>Darwin Harbour</td>
<td>Frances Bay</td>
<td>Stokes Hill Wharf</td>
<td></td>
</tr>
<tr>
<td>Owner</td>
<td>London Pearl fishing Company/Eastern and Australian Trading Association/A L Coventry</td>
<td>Browse Island Company, Proprietary, Ld.</td>
<td>S. Moore</td>
<td>George Haritos</td>
<td>Bill Jelley</td>
<td></td>
</tr>
<tr>
<td>Cargo</td>
<td>Stores, diving, ships gear</td>
<td>Crude Oil</td>
<td></td>
<td>Barramundi fishing boat</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of crew</td>
<td>3</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine</td>
<td>Twin 4 cylinder oil Normaplan Bros. Cologne</td>
<td>2 cylinder Lysekils M.V./80hp Skandia engine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>*ANSD/Lloyd’s 1895</td>
<td>Lloyd’s 1921/Clark and Jung 1995</td>
<td>Lloyd’s 1921/*NLAND</td>
<td>ANSD</td>
<td>Clark &amp; Jung 1995</td>
<td>Clark &amp; Jung 1995</td>
</tr>
</tbody>
</table>

*ANSD = Australian National Shipwreck Database; National Libraries Australia Newspaper Database
Coral and Chinta
The vessels Coral and Chinta have few details which support or refute their identification as the Frances Bay wreck. Despite newspaper searches, no details concerning the size or construction details of these vessels have been located. Thus they cannot be ruled out due to a lack of information.

Betty Joan
The vessel Betty Joan is similar to the above vessels in that little is known about it other than that it was used by Darwinian George Haritos as a barramundi fishing vessel. The length is similar to the estimated Frances Bay wreck length as is the wrecking date of post-1891. More information about Betty Joan may be found in the Northern Territory Archives oral history interview with Haritos about Cyclone Tracy (NTRS 226, transcripts 232 and 662).

Another source of information about Betty Joan comes from email communication between Lewis and staff at MAGNT (Lewis 1996). According to Lewis, the vessel "...had one engine and was of wooden oregon construction...George’s daughter says Betty Joan was up on some rocks and she was partly burnt." However in a later email he states, "We have compared our porthole with several that are in the possession of the daughter of the owner of 100’ yacht Betty Joan, lost in Cyclone Tracy in 1974. Our porthole is bigger. The owner’s daughter is also adamant that no prisms such as the one recovered from our Darwin wreck were let into the deck of the Betty Joan. We checked her statistics of the yacht – it had two engines, whereas this wreck only seems to have one." Thus, Lewis eliminated Betty Joan as a possibility for the Frances Bay wreck based on the size of the portholes, recollections that the vessel did not have skylights and the number of engines.

Flowerdale
The vessel Flowerdale appears to fulfil several characteristics similar to the Frances Bay wreck. A wooden 113-ton schooner, Flowerdale was owned by the Eastern and Australian Trading Association and used as a floating store. It was permanently moored alongside the government dock when it caught fire with crew on board. Few items could be salvaged before the entire vessel was engulfed in flames. The burning hull was dragged to Stokes Hill and left on the rocks where it continued to burn (Northern Territory Times and Gazette 1899).

While the length of the vessel is similar to the wreck, one feature that suggests Flowerdale may not be the Frances Bay wreck is the absence of an engine in the 1895 Lloyd’s listing. Further, considering the date of the sinking (1899), the possibility of a hot-bulb engine (post-1891) being on board a vessel which was permanently docked and being used as a floating store is low. Thus it is unlikely that the Frances Bay wreck is the vessel Flowerdale, however it cannot be ruled out.

Rachel Cohen
The vessel Rachel Cohen is a possibility that has been considered by previous enthusiasts (Lewis 1997; 1997a). The circumstances of its sinking are described below:

"About 2 o’clock on Wednesday morning three half-castes [sic], member of the crew of the “Rachel Cohen”, who were sleeping aboard, were awakened by intense heat and on making an investigation found that the vessel was on fire, and the engine room burning fiercely. Water was played on the fire without avail owing to a large quantity of crude oil being on board. When this caught alight the men who were fighting the fire took the boat and rowed to the shore, but again returned. However all efforts to save the
vessel proved unavailing, and at about 11 a.m. she was burnt to the water edge and sank. During the blow on Monday night the vessel dragged her anchors and was shifted to Francis Bay on Tuesday, at which place she was burnt. A large number of people watched the fire from various high points. We understand that the vessel was insured for £2,500. The members of the crew who were aboard at the time, lost everything. A marine enquiry will probably be held.” (Northern Standard 18 January 1924)

Many details of the vessel Rachel Cohen and its wrecking event align with the Frances Bay wreck with the exception of one major feature – the type and number of engines. The Frances Bay wreck has only one engine while Rachel Cohen is listed in the 1921-22 Lloyd’s Register as having “twin 4 cylinder Normaplan Bros oil engines”.

A probe survey was specifically conducted on the Frances Bay wreck to identify a second engine that perhaps was buried beneath the sediment, but this survey was met with no success. Further, the engine on the wreck has a single cylinder while Rachel Cohen is listed as having four cylinder engines. Thus if one engine was salvaged and one remained, the engine design still does not fit with the Lloyd’s description. Finally, no indication of a second engine bed was located on the wreck remains and second engine is highly unlikely as the extant engine is located directly on top of the keel assembly. Thus it is unlikely that the Frances Bay wreck is the vessel Rachel Cohen.

Huddersfield

The final vessel to be considered is Huddersfield, a 174-ton schooner lost in December 1928 when it sprang a leak and sank in the Harbour (NT Times & Gazette, 11 July 1924). The wooden construction (built in NSW using Australian timber), length, presence of a single engine and date of the vessel fit with the Frances Bay wreck details (Figure 25). However there is the exception of one detail – the reported number of cylinders on the engine listed in the Lloyd’s register. While the wreck’s engine has been identified a single cylinder oil engine, the register records Huddersfield was installed with a two cylinder oil engine. With the exception of this detail, Huddersfield is the most likely candidate for the Frances Bay wreck.

While there may be other vessels that wrecked in Frances Bay, those wrecks have yet to be identified in the lists of known shipwrecks and therefore were not considered as possibilities. Future research into the most likely candidate, Huddersfield, should include a clarification of the number of engine cylinders and a positive identification of the wreck engine. Additionally, locating scantling measurements for Huddersfield to compare with the Frances Bay wreck may provide further evidence. More timber samples would be useful for determining details about construction. Finally, further archival research would aid in determining whether Huddersfield was burned or salvaged and if so to what extent.
Management Considerations
The wreck lies partially buried in muddy, silty sediment. Some portions of wooden structure are exposed and therefore are susceptible to both wood-boring organisms and scouring. Many of the large iron components such as the engine, auxiliary engine and winch are also exposed on the seabed and as a result are heavily concreted. While no obvious areas of active corrosion were noted, the site should be regularly monitored for changes in sediment, further degradation of wood and active corrosion of metals.

Due to its location along the edge of an active shipping channel, the wreck site may be subjected to greater erosion and scouring processes than a shipwreck located in a more stable area. Prop wash and underwater current created by large vessels passing may alter sediment levels on the site. Further, any dredging of the channel will undoubtedly impact the shipwreck site.

The movable artefacts on this site are numerous, ranging from many sections of copper alloy sheathing to glass deck prisms. These readily accessible and collectible artefacts are in danger of being looted by sport divers wishing to have a souvenir of the wreck. It is likely that some degree of looting has already occurred, particularly when the wreck was first located. Lewis mentions a binnacle found on the site which was not located during the July survey and may be gone or perhaps buried. Further the whereabouts of those objects removed by Lewis’ team are unknown. Because the site is shallow and relatively close to shore, it may become a target of souvenir divers if the location is publicised. Additionally, if the site location becomes publicised it is likely that the site will be visited by fishers. Past impacts on historic wrecks caused by fishers have been identified in the form of litter and anchor damage.
Recommendations
The following recommendations are made:

1) Due to the fact that the shipwreck remains unidentified and to the fragility of portable artefacts found on site, it is not recommended to disclose its location to the general public at this time.
2) A magnetometer and side scan sonar survey is suggested to search for any features nearby the wreck which were not surveyed in July 2010.
3) Further archival and archaeological research should be conducted into the identification of the shipwreck. This may necessitate additional site survey including more timber sampling and a more detailed recording of engine details.
4) If a conservation plan is written and funded, the recovery, conservation and curation of certain moveable artefacts is recommended under the threat of looting. An alternative would be in situ reburial efforts if funding cannot be secured for recovery.
5) If financial resources are available and a location is identified for display, the recovery and interpretation of certain artefacts is advisable for the public interpretation of Darwin's maritime history.
6) As this wreck is significant to Darwin's maritime history, being one of the only wooden wrecks identified and archaeologically investigated and the only Australian-built vessel archaeologically identified in Darwin Harbour, it should be considered a candidate for the Heritage Register.

References


Jubbs, L. R. 1997. Royal Australian Air Force "Marine Section": The Forgotten Era of Men and Vessels. Kingsley, Western Australia, Published by Author.

Lewis, T. 1996. Email Communication. On file at the Heritage Branch NT.


(1895). "Lloyd's register of shipping."

(1921-22). "Lloyd's register of shipping."


Appendices
Appendix 1: Table of potential wrecks
Appendix 2: Lloyd's Register for Huddersfield
Appendix 3: Timber Sample Results
Method for determining potential includes:
1. Wrecked in Darwin Harbour (specifically Frances Bay)
2. Wrecked after 1891 (earliest dates of engine manufacture)

Note: all possible candidates included under these criteria, however some do not fit with wreck remains (i.e. size, construction materials, etc.)

Table 3. Table of potential vessels which wrecked post-1891 in Darwin Harbour

<table>
<thead>
<tr>
<th>Wreck Name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betty Joan</td>
<td>Wrecked in Frances Bay in 1974 (Cyclone Tracy)</td>
</tr>
<tr>
<td>Charity</td>
<td>Lugger wrecked in Frances Bay in 1897</td>
</tr>
<tr>
<td>Chinta</td>
<td>Yacht wrecked in Frances Bay in 1974 (Cyclone Tracy)</td>
</tr>
<tr>
<td>Faith</td>
<td>Lugger wrecked in Frances Bay in 1897</td>
</tr>
<tr>
<td>Rachel Cohen</td>
<td>Schooner lost in Frances Bay in 1924</td>
</tr>
<tr>
<td>Spray</td>
<td>Wrecked at moorings in Darwin Harbour in 1915</td>
</tr>
<tr>
<td>Afric</td>
<td>Wrecked in Darwin Harbour in 1915</td>
</tr>
<tr>
<td>Ark</td>
<td>Wrecked in Darwin Harbour in 1897</td>
</tr>
<tr>
<td>Black Jack</td>
<td>Sailing vessel wrecked in Darwin Harbour in 1897 (*identified as Lugger in NT newspaper)</td>
</tr>
<tr>
<td>Cameo</td>
<td>Wrecked in Darwin Harbour in 1919</td>
</tr>
<tr>
<td>Coral</td>
<td>Wrecked in 1932</td>
</tr>
<tr>
<td>Darwin Harbour Unid Lugger No. 1</td>
<td>Wrecked in Darwin Harbour in 1939 due to explosion of a Primus Stove</td>
</tr>
<tr>
<td>Darwin Harbour Unid Lugger No. 2</td>
<td>Wrecked in Darwin Harbour in 1910</td>
</tr>
<tr>
<td>Dawn</td>
<td>Vessel with the lugger Yampi Lass blown ashore in gale in Darwin Harbour in 1942</td>
</tr>
<tr>
<td>Flowerdale</td>
<td>Wrecked in Darwin Harbour in 1899</td>
</tr>
<tr>
<td>Gertrude</td>
<td>Wrecked in Darwin Harbour in 1896 (*newspaper calls it a lugger)</td>
</tr>
<tr>
<td>Jack</td>
<td>Wrecked in Darwin Harbour in 1896</td>
</tr>
<tr>
<td>Midge</td>
<td>Wrecked in Darwin Harbour in 1906 (*newspaper calls it a cutter)</td>
</tr>
<tr>
<td>Olive</td>
<td>Wrecked in Darwin Harbour in 1897</td>
</tr>
<tr>
<td>Revenge</td>
<td>Wrecked in Darwin Harbour in 1897</td>
</tr>
<tr>
<td>Roebuck</td>
<td>Wrecked in Darwin Harbour in 1897 (*newspaper called it a lugger)</td>
</tr>
<tr>
<td>Scout</td>
<td>Wrecked in Darwin Harbour in 1896 (*newspaper called it a lugger)</td>
</tr>
<tr>
<td>Encyclopaedia of Australian Shipwrecks (<a href="http://oceans1.customer.netspace.net.au/nt-wrecks.html">http://oceans1.customer.netspace.net.au/nt-wrecks.html</a>)</td>
<td></td>
</tr>
<tr>
<td>Afric</td>
<td>Lugger, 12 tons. Founder off Croker Island, NT, in a cyclone, 25 February 1915. [LW]**</td>
</tr>
<tr>
<td>Ark</td>
<td>Pearling cutter, 6 tons. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW]</td>
</tr>
<tr>
<td>Blackjack</td>
<td>Pearling lugger, 6 tons. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW]</td>
</tr>
</tbody>
</table>
| Brisbane         | Pearling lugger, 11 tons. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of
the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW]

**Cameo**
Lugger. Destroyed in a storm at Darwin, 6 March 1919. [LW]

**Charity**
Pearling lugger. Left Darwin on 8 April 1897 heading for Western Australian waters but not seen again. [LW],[TL]

**Cleopatra**
Pearling schooner. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW],[TL] (*newspaper says it was lugger*)

**Faith**
Pearling lugger. Left Darwin on 8 April 1897 heading for Western Australian waters but not seen again. [LW],[TL]

**Jack**
Pearling lugger, 11 tons. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW]

**John Alce**
Auxiliary ketch, 33 tons. Built Gosford 1906. Owned by the Commonwealth. Destroyed in heavy weather near the Darwin jetty, 16 November 1921. [LW] (**Newspaper list this as dismasted during this storm and sold to QLD**)

**Lighter No. 2**
Lighter, 66 tons. Lost by enemy action near Darwin, 1943. [LW]

**Maggie**
Pearling lugger, 14 ton. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW]

**Maggie**
Schooner. Destroyed in a storm at Darwin, 6 March 1919. [LW] (*newspaper says it is 9-ton pearling lugger*)

**Olive**
Pearling schooner, 11 ton. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW]

**Prairie Moon**
Lugger. Destroyed by fire in Northern Territory waters, 9 February 1938. [LW]

**Rachel Cohen**
Wooden schooner, 171 tons. Built Manning River, NSW, 1871. Lbd 105.5 x 21 x 10.4 ft. Known to have operated in eastern Victorian waters in the 1880s, and also to Macquarie Island. Swept by fire while anchored in Darwin Harbour, 15 January 1924. It was eventually extinguished but a fresh outbreak several hours later destroyed her and she sank in Francis Bay. [LW],[LPA],[TL]

**Revenge**
Pearling schooner, 15 tons. Destroyed in cyclone off Darwin, 7 January 1897. The cyclone killed 28 people on land and sea. Of the 29 pearling luggers at anchor, 19 were destroyed and ten lives were lost. [LW],[TL]

**Spray**
Launch. Destroyed in a cyclone in Darwin Harbour, 23 December 1915. [LW]

**Yampi Lass**
Lugger. Ashore and destroyed by a gale at Darwin, 12 April 1943. [LW]

**Unidentified**
Two luggers were sunk during a cyclone, Darwin, 23 December 1915. [TL]

**Unidentified**
Lugger. Destroyed by fire while in Darwin harbour, early September 1939. [LW]

* Where necessary newspaper articles for the date of wrecking were sought for complete vessel details.

**LW = Jack Loney, Wrecks of the Western Australian Coast; TL = Tom Lewis, Wrecks in Darwin Waters; LH - Jack Loney & Peter Stone, High and Dry; LPA - Jack Loney, Ships and Shipwrecks at Port Albert.***
<table>
<thead>
<tr>
<th>Numéro</th>
<th>Nom</th>
<th>Tonnage</th>
<th>Dimensions en Douane</th>
<th>Motrice : Type et Détails</th>
<th>Date de Construction</th>
<th>Nom des Constructeurs</th>
<th>Armateur</th>
<th>Port d'attache</th>
</tr>
</thead>
<tbody>
<tr>
<td>18168</td>
<td>Helga Silva</td>
<td>140</td>
<td>107'6&quot;x25'1&quot;</td>
<td>Motor</td>
<td>4th April 1918</td>
<td>Gorton-Pew, Vensol Co.</td>
<td>Gloet, Maastricht</td>
<td></td>
</tr>
<tr>
<td>18176</td>
<td>Helma</td>
<td>225</td>
<td>125'0&quot;x27'5&quot;</td>
<td>Oil Engines 2Cy.18&quot;-11&quot;</td>
<td>4th April 1919</td>
<td>Vineland, U.S.A.</td>
<td>Vineland, N.J.</td>
<td></td>
</tr>
<tr>
<td>18194</td>
<td>Hemmingfeld</td>
<td>102</td>
<td>69'3&quot;x20'4&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>Elfin, Maastricht</td>
<td>Elin, Maastricht</td>
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<td>18197</td>
<td>Hendrika</td>
<td>147</td>
<td>97'7&quot;x19'9&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>Rederi A/B, Karlskoga</td>
<td>Karlskoga, Sweden</td>
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<td>18199</td>
<td>Hendrika</td>
<td>105</td>
<td>96'2&quot;x21'6&quot;</td>
<td>6'4&quot; Motor</td>
<td>4th April 1919</td>
<td>Zierer, Landshut</td>
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<td>18206</td>
<td>Henri</td>
<td>114</td>
<td>97'5&quot;x20'3&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>Dufry, La Rochelle</td>
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<td>18254</td>
<td>Hina</td>
<td>538</td>
<td>184'4&quot;x27'11&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>Hedin &amp; Co., Lysvik</td>
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<td>18233</td>
<td>Herbert Parker</td>
<td>139</td>
<td>100'3&quot;x25'2&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>A.W. Williams, Falmouth</td>
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<td>18405</td>
<td>Hibernia</td>
<td>260</td>
<td>135'0&quot;x23'2&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>L. &amp; S. Smith, Sappemeer</td>
<td>L. &amp; S. Smith, Sappemeer</td>
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<td>18450</td>
<td>Hilda</td>
<td>111</td>
<td>94'2&quot;x22'0&quot;</td>
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<td>4th April 1919</td>
<td>F. &amp; C. G. Bolinders Co., Ltd.</td>
<td>F. &amp; C. G. Bolinders Co., Ltd.</td>
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<td>18462</td>
<td>Hillsborough</td>
<td>380</td>
<td>105'0&quot;x30'8&quot;</td>
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<td>4th April 1919</td>
<td>B. M. McMillan, American</td>
<td>B. M. McMillan, American</td>
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<td>18591</td>
<td>Holden Evans</td>
<td>3254</td>
<td>298'4&quot;x47'2&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>L. &amp; S. Smith, Sappemeer</td>
<td>L. &amp; S. Smith, Sappemeer</td>
<td></td>
</tr>
<tr>
<td>18550</td>
<td>Holger</td>
<td>147</td>
<td>95'2&quot;x22'3&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>Fraktakabo Holger</td>
<td>Gothenburg, Sweden</td>
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<td>18617</td>
<td>Hollands Trouw</td>
<td>205</td>
<td>190'0&quot;x91'5&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>F. &amp; C. G. Bolinders Co., Ltd.</td>
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<td>18668</td>
<td>Hong Kent</td>
<td>114</td>
<td>115'0&quot;x20'5&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>W. B.主机 &amp; Co., Ltd.</td>
<td>W. B.主机 &amp; Co., Ltd.</td>
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<tr>
<td>18729</td>
<td>Horn Shell</td>
<td>2413</td>
<td>241'4&quot;x40'0&quot;</td>
<td>Motor</td>
<td>4th April 1919</td>
<td>F. &amp; C. G. Bolinders Co., Ltd.</td>
<td>F. &amp; C. G. Bolinders Co., Ltd.</td>
<td></td>
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</tbody>
</table>
WOOD IDENTIFICATION RESULTS

Dr Jennifer F. McKinnon  
Lecturer in Maritime Archaeology  
Flinders University  
GPO Box 2100, Adelaide  
South Australia 5001

Dear Jennifer,  
Re: Assessment of frame timber, 10.3 Baseline, 0.40 Port side. JM 9 July, 2010,  
Following microscopic examination, in my opinion the structure of the wood specimens is consistent with:  

Eucalyptus ?acmenoides - White mahogany

I hope the information will help with your research and evaluation process.

Best regards,

Jugo Ilic

Jugo Ilic MSc, Dr(Forest)Sc, FIAWSc
KNOW YOUR WOOD

19 Benambra Street, South Oakleigh,
Victoria 3167, AUSTRALIA
Phone: 03 95127523
Mobile: 0412786482
Email: knowyourwood@bigpond.com
Provider of wood identification services.

INVOICE NO: 234_McKinnon
Invoice Date: 10th Aug 2010

Dr Jennifer F. McKinnon
Lecturer in Maritime Archaeology
Flinders University
GPO Box 2100, Adelaide
South Australia 5001
P: 08 8201 5875 E: Jennifer.McKinnon@flinders.edu.au

For:
Assessment of frame timber, 10.3 Baseline, 0.40 Port side. JM 9 July, 2010,

TOTAL PRICE
$140.00

Please forward e-transfer or cheque within 14 days to: Know Your Wood

19 Benambra St.,
South Oakleigh,
Victoria, 3167

payment by direct e-transfer:

Account name: Know Your Wood
Account No. 23168499
BSB No: 803140
Bank/Credit Society name: MECU (Members & Education Credit Union)

1 Please do not add GST