Wollongbar (II) Shipwreck Inspections 2019 Off Crescent Head, NSW

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Figure 1 (Cover): *Wollongbar* (ll) during fleet visit in Sydney 1914 (Image: Ballina Museum Collection #190716121058-0001)

Executive Summary

This report examines the remains of a shipwreck which was discovered and reported approximately 11.7km (6.32 nautical miles – Nm) offshore from Crescent Head in 2019 and summarises the results of recent historical research and a maritime archaeological investigation of the site.

Fieldwork investigations of the site used multi-beam sonar technology and photographed using a remotely operated vehicle (ROV) to provide images that were then compared with historical records for the coastal steamship SS *Wollongbar* (II), which was known to have been torpedoed by a Japanese submarine in this area in 1943.

Based on the available evidence the wreck has been identified as the SS *Wollongbar* (II).

The circumstances of the sinking of this vessel led to the loss of 32 lives, and hence this vessel is of potential significance for its association with Australia's World War II Merchant Navy history and especially to the local community and relatives of the victims.

Underwater footage of the site also revealed that the wreck is likely to be an aggregation site for the critically endangered Grey Nurse shark which adds to the importance of the site.

The wreck is in Commonwealth waters off Crescent Head (NSW). All wrecks in Commonwealth waters greater than 75 years old are automatically protected under the Underwater Cultural Heritage Act 2018 (Commonwealth).

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To anyone omitted, we offer our sincere apologies.

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Abbreviations

Approx.	Approximately
ASDIC	Anti-submarine Detection Investigation Committee
AUV	Automated Underwater Vehicle
Capt.	Captain
CSIRO	Commonwealth Science and Industrial Research Organisation
DEMS	Defensively Equipped Merchant Ship
DMS	Defence Maritime Services
DON	Department of Navy
DPI	Department of Primary Industries (NSW Government Agency) – Now Department of Planning Industry and Environment
DSTG	Defence Science Technology Group (Commonwealth Government)
ft	Feet
HD	High Definition (video)
HDNA	Hexanitrodiphenylamine (explosive)
HIVE	Hub for Immersive Visualisation and eResearch, Curtin University
HMAS	Her Majesty's Australian Ship
HP	Horsepower
kt	Knots
m	Metres
MAAS	Museum of Applied Arts and Science
MHO	Maritime Heritage Online Database
Nm	Nautical Miles
NAA	National Archives of Australia When referencing National Archives of Australia files in the text of this document, the following convention has been used: (NAA / Barcode # of file / Page # in file / Correspondence Reference # on Page).
NARA	National Archives and Records Administration, (US National Archives)
NHP	Nominal Horsepower
RAN	Royal Australian Navy
ROV	Remotely Operated Vehicle
RMS	Roads and Maritime Services (NSW Government Agency) – Now Transport for NSW
SS	Steamship
TfNSW	Transport for NSW (NSW Government Agency)
TNT	Trinitrotoluene (explosive – sometimes known as dynamite)
TOO	Time of Origin (in NAA documents)

Glossary

Aft	Located towards the stern.
Anchor Locker	The area below deck in the bow where the anchor chain and/or hawser ropes could be stored.
Anchor Cable	Linked chain used to secure the vessel to the anchor.
Amidships	In the centre along the length of the vessel.
Athwart	The direction running across the centre of the vessel.
Bilge	The lowest sections of a vessel below deck.
Bitts	Steel bollards mounted on decks to attach mooring or other ropes to.
Bosun's Locker	Small compartment located in the foredeck used for storing rigging and other spare parts
Boiler	A cylindrical device used to boil water to provide steam under pressure to power the vessel's steam engine.
Bow	Front end of the ship.
Brake Wheel	A handle operated wheel used to control the speed of a windless when recovering/ deploying anchor chain cable.
Bridge	The area from where the vessel is steered using the ships wheel.
Bridge Deck	The highest deck on this vessel from which the vessel is steered.
Cable Lifters	Recessed and rotating area between two wheel drums on a windless where each anchor cable link is slotted when raising the anchor.
Cant Frame	The frames of a vessel in the bow and stern area. Frames in this area usually do not run perpendicular to the keel (as in the rest of the vessel) but are angled (or canted) to form the tapered shapes of the bow or stern.
Catalina	An amphibious aircraft used in WWII.
Deck	The floor in a vessel. Decks were named at after the level at which they occurred inside a vessel.
Deck Beam	A steel support structure that runs athwart (across) the vessel form the support for the deck of a vessel.
Deckhook	The boomerang shaped structural piece which is attached to the stempost forming a support for the deck and which defines the shape of the bow at that level.
Derrick Crane	Shipboard crane consisting of a central steel mast and luffing pole. Used to load/ unload cargo from and to the vessel.
Derrick Crane Winch	Machinery used to wind/ unwind cable used to raise and lower cargo using the derrick crane.
Focsle	Also known as the forecastle. The raised structure on the bow section of the vessel which housed the anchors and forward derrick crane.
Fore / Forward	Located towards the bow.
Foredeck	Raised deck at the bow. Forms the top of the forecastle or focsle.
Frames	Steel members used to form the shape of a vessel onto which hull plates are fastened (similar to ribs in a skeleton).
Gun Pillar Mount	Large raised metal base used on which to mount a ship's gun.
Hawse Hole	A lined hole in the hull side of a vessel through which a hawser (rope) could be passed to moor a vessel.
Hawse Pipe	Vertical pipe through which a length of chain or hawser could be passed below deck to the anchor or hawse locker.
Hawser	Length of rope used to moor a ship alongside a wharf or dock.
Hold	An area beneath decks for carrying cargo.
Hounds or Cheeks	Structural support pieces (shaped like an elbow) on either side of a mast used to either support a platform (a top).
Hull	The outside surface of a vessel.

Hull Plate	Sections of steel plate used to form the outside of a vessel.
Keel	The lowest longitudinal steel structural component which forms the backbone of the vessel.
Lifeboat Davit	A movable upright post used as a pair to launch a lifeboat.
Longitudinal	The direction running through the centre of the ship lengthwise.
Lugs	Small steel plates used to connect structural components within the vessel.
Main Deck	The deck that runs the full length of the vessel just above water level.
Multibeam Sonar	Remote sensing technology which uses sound waves of multiple frequencies to produce 3D images of an underwater feature.
Navigation Running Light	A light used to display the direction of a ship when underway. Used by other ships to determine which direction the observed vessel is travelling.
Nominal HP	An early 19th-century rule used to estimate the power of steam engines.
Paravanes	Poles mounted on the side of the vessel used to detonate mines (or cut their cables) or to blow up submarines. Used as a defensive device in WWII on merchant vessels.
Plumb Bow	Vertical bow – straight up and down.
Port	Left side of a vessel when facing towards the bow.
Porthole	A fixed circular window mounted in the side of the hull.
Promenade Deck	The deck between the main deck and the bridge deck. Passengers were usually housed on this deck and would hence promenade (walk) around the deck.
Rubbing Strake	Strip of sacrificial steel running the length of the outside of the hull used to protect the ship's hull from damage when alongside a wharf or another vessel.
Sand Groyne	A structure used to slow down a current running along the shore. This causes sediment and sand suspended in the water to drop, building up sand in those areas. This technique is used extensively to retain beaches that would normally be eroded away.
Scuttle	Circular window in the side of the hull similar to a porthole, but with attached closing cover to keep out the light and hinged opening panel to let in fresh air.
Starboard	Right side facing towards the bow.
Steam Engine	An engine that operates using steam to push engine cylinders up and down.
Stem	The steel structural vertical piece at the bow which forms the forward most shape of the vessel.
Stern	Back end of the ship.
Stern Gland	The connection of the propeller shaft to the drive shaft.
Shaft Tunnel	A tunnel formed along the interior of the ship just above the keel where the drive shaft from the engine runs to connect to the propeller shaft.
Strake	A plank that runs along the outside length of the vessel.
Stringer	A structural piece that runs fore and aft through a vessel which defines the shape of the vessel and supports the hull and frames (e.g. stringers can support the hull edge of the deck, the hold or the bilge).
Tail Rods	Vertical rods that sit above the external top of each piston/ cylinder cover on a triple expansion steam engine
Toe Scouring	Erosion caused by a water current going past a solid structure, causing a venturi (or mini tornado effect) as it moves past it.
Top	A small platform located up a mast, that is supported by structural members called hounds or cheeks located on either side of the mast.

Triple Expansion Engine	A large upright steam engine that uses 3 different size cylinders to drive the engine. Steam from the HP engine is release in a bigger sized cylinder to drive that cylinder's piston, then vented into the largest cylinder to expand again and drive the last piston. These engines made use of the steam 3 times for more economical use, as the steam would again expand in the next cylinder when vented into it.
Tonnage (Gross)	Total volume of a vessel.
Tonnage (Net)	Total volume of a vessel dedicated for cargo (i.e. calculated by deducting the space for machinery and engines and other non-cargo areas)
Three Island Ship	A vessel constructed with three distinct areas of superstructure above the main deck consisting of a foredeck, bridge and promenade decks, and stern quarter deck.
Ventilator Tubes	A funnel shaped structure mounted on decks and used to force air below decks for ventilation.
Warping Ends	The waisted drums at the end of a winch/windlass around which ropes/cables are wound to haul on the line. Used on this vessel on the derrick winch.
Windlass	Machinery used to raise and lower the anchor and to tighten mooring ropes.

1. INTRODUCTION

On the 29th April 1943, the coastal trader steamship SS *Wollongbar* (II) was sunk by a Japanese I Class submarine after leaving Byron Bay with a cargo of frozen bacon, boxes of butter and cheese.

For many years there were anecdotal reports of a large shipwreck in the vicinity of the historic loss and a tentative location was recorded in various editions of the Historic Shipwrecks Atlas (NSW Heritage Office 1992; NSW Heritage Branch 1996).At that time no official reports were made by the local community or from commercial and recreational fishermen that would enable precise location of a wreck site.

In May 2019, a report was received by Heritage NSW that a wreck had been found off Crescent Head in the Mid North Coast Region of NSW. The reporter (Matt Dawson) indicated that line fishermen had discovered the wreck after pulling an iron stained piece of worked timber to the surface whilst fishing at the location. The source advised the local community thought that it might be the wreck of the SS *Wollongbar* (II), which was torpedoed by a Japanese I Class submarine off Crescent Head in 1943.

Following this report, Heritage NSW undertook two inspections of the site on 23rd July and 25th September 2019 to investigate the possible identity of the wreck. The first inspection was undertaken to locate the site and to undertake a multi-beam sonar inspection to determine the size and other characteristics of the possible wreck. The second inspection was conducted using a Remotely Operated Vehicle (ROV) to record details of the site that could possibly aid in its identification.

This report considers new and detailed evidence to confirm the identity of the previously unidentified vessel located of the Crescent Head, NSW is the coastal steamship SS *Wollongbar* (II).

2. HISTORY

a. The Ship

The steamship (SS) *Wollongbar* (II) was commissioned by the North Coast Steam Navigation Company to replace their earlier vessel *Wollongbar* (I) which sank at Byron Bay on 14 May 1921 (MHO # 247). The North Coast Steam Navigation Company ran a regular passenger and cargo steam ship service along the NSW Northern coast, and the loss of the first vessel dramatically affected local communities.

The new vessel was constructed in Glasgow by Lithgows Ltd. Works began at the Kingston Shipbuilding Yard # 746, where the vessel was launched on 28 August 1922 and completed in October that same year. Registered in Sydney (Official # 150190) it measured 86.89 m (285.1 ft) long, 12.83 m (42.1ft) beam with a draught of 7.284 m (23.9 ft); a gross tonnage of 2240 tons and a net load carrying capacity of 874 tons. The vessel operated along the coast carrying general cargoes and passengers from 1922 until the beginning of World War II mostly operating between Sydney and Byron Bay (Figure 2). It had large refrigerated compartments for carrying food and was equipped to accommodate up to 150 passengers. (Caledonian Maritime Research Trust 2019; Cooper and Turner 2010:6; Richards 1987: 63)

Figure 2: *Wollongbar* (II) alongside a wharf (Image: AWM Collection n.d.)

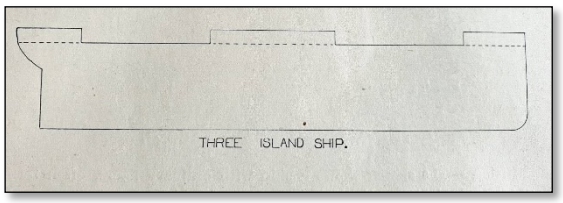

Figure 3: Three Island Ship Design (Image: Pursey 1948: 17)

The *Wollongbar* (II) was a "three island" design type of coastal freighter (Figure 3), with a longitudinal main deck and three islands formed by the forecastle/ foredeck; amidships bridge/ promenade/ accommodation structures; and stern quarter deck (see Pursey 1948: 17).

It was fitted with derrick cranes on the fore and aft decks (probably to keep passenger activity away from loading operation areas, which was unusual for cargo vessels at this time (Figure 4; Figure 5). The bridge was located at the fore amidships area, with crew's accommodation at the rear. Although the vessel was also fitted with two funnels to resemble its predecessor and to give passengers the impression of speed, it was actually operated by only one four-cylinder triple expansion steam engine (Cooper and Turner 2010:6; Richards 1987: 63). The engine was constructed by David Rowan and Company, with 4 cylinders (25, 40, 44.5, 44.5 x 36in size) producing 218 nhp (Caledonian Maritime Research Trust 2019). Refrigerated holds were located under the fore amidships area, and aft above the engine and boiler spaces (Figure 87).

Figure 4: *Wollongbar* (II) under weigh (Image: Green 1940, State Library of Victoria Collection)

Figure 5: *Wollongbar* (II) approaching a wharf (Image: Slevin Collection 1922)

During World War II, the *Wollongbar* (II) was equipped as a Defensively Equipped Merchant Ship (DEMS). This meant the vessel was supplied with protective armament along with a DEMS seaman gunner to operate the gun to defend itself from enemy shipping and aircraft. On some ships DEMS personnel included a petty officer, a leading seaman gunner and two able seamen gunners, generally accommodated close together onboard. At the beginning of the war there was no pool of DEMS trained personnel, and as soon as a gun was fitted to a merchant ship, a rating was assigned to that ship. The DEMS assistants depended on the skills of the crew onboard, and in the first two years of the war, only one rating was assigned per gun per ship.

The only DEMS crew gunner on the *Wollongbar* (II) was a Mr Dennis White from Hobart. This suggest that the *Wollongbar* (II) was only equipped with one gun, which was probably mounted on the stern deck (Marcus 1986: 17, 20,22,129, 202). This was confirmed by Department of Navy (Navy Office) Correspondence, which requested permission to mount one "*12 pounder HA / LA gun J. Wallace Storey and Keers; to fit 2 Pac Projector mounts and to mount two Vickers Machine Guns (White and Co)*" (NAA 1942, # 5941087, p3, TOO 0121Z/6) and the work was approved on 8 Oct 1942 (NAA 1942, # 5941087, p2, DON 674-206-1458). It appears from the request above that the work was probably carried out at Storey and Keers boatyard, which was located in Balmain (Balmain History n.d.; Local Notes 2012).

The vessel was also fitted with paravane equipment at Garden Island by November 1941, (NAA 1941, # 5947772, p 4 TOO 2320Z2; NAA 1941, # 5947774), which required ongoing repairs by December 1942 (NAA 1942, # 5931142; NAA 1942, # 5931056). Two types of paravanes existed in WWII. One was used to detonate mines or sever their cables. Paravanes were also employed in WWII as antisubmarine weaponry, which swept behind the towing vessel and contained a 80 (36kg) pound charge of TNT which would automatically detonate on contact with a submarine or could be controlled by the ships bridge, and could be readily deployed whenever a submarine was sighted or suspected (Wikipedia 2019a).

b. Wartime Service and Enemy Action

Following the attack on Pearl Harbour in December 1941, from 1942 onwards, Japanese submarines were known to be patrolling the NSW and Australian Eastern coastline. On 16 May 1942, the Russian Freighter *Wellen* was attacked by the *I 29* with its deck mounted gun (Smith 2012:1)

In May 1942, a fleet of Japanese *I* Class submarines gathered off Sydney Harbour, and launched an attack on 31 May 1942 in which three Ko-Hyoteki (甲標的) midget submarines were launched from their motherships in an attempt to destroy shipping inside the Harbour. Although unsuccessful in sinking allied shipping, the M24 midget submarine launched two torpedoes, one of which sank the requisitioned Sydney Ferry HMAS *Kuttabul*, with the loss of 21 lives. This submarine was the only one to escape the harbour and its sunken hull was later found in 2006 by a local diving group (No Frills Divers). For more detailed analysis of the attack see Smith (2007) and Duncan and Smith (2016).

After the failure of the Sydney Harbour attack, two of the submarines involved in the midget attack came back inshore. *I-24* shelled Sydney's eastern suburbs at 12.30am on 8 June 1942 with its deck gun. The *I-21* moved north and shelled the port of Newcastle at 2.45 am that same night. The fleet of *I* Class submarines then proceeded up the coast to continue shipping attacks on the following vessels which were sunk:

- *Iron Chieftain* (June 1942) - off Sydney;
- *Iron Crown* (June 1942) - off Gabo Island;
- *SS Guatemala* (June 1942) – Nth of Sydney;

After the sinking of the SS *Guatemala* the *I*-class submarine fleet that had brought the midget submarine attack to Sydney left, and further attacks were delayed until July 1942, when a new fleet of attack submarines arrived off NSW. The submarines included *I-11*, *I-24* on its second Australian war patrol, and *I-175* (Smith 2012). These boats attacked and sank the following vessels:

- *George S Livanos* (July 1942) - off Jervis Bay;
- *Coast Farmer* (July 1942) - off Jervis Bay;
- *William Dawes* (July 1942) - off Tathra;
- *Dureenbee* (Aug 1942) - off Moruya;

A fresh wave of submarine attacks commenced against merchant shipping in early 1943, which were undertaken by the *I* class Japanese submarines: *I-21*, *I-26*, *I-174*, *I-177*, *I-178* and *I-180*. Renewed attacks were undertaken from April 1943 onwards by the *I-26*, *I-177*, *I-178*, and *I-180* submarines. From the beginning of 1943 until the day before *Wollongbar* incident, the submarines damaged a further six ships and sank another six vessels in NSW's waters (Smith 2012), including:

- Kalingo (Jan 1943) - off Sydney;
- *Iron Knight* (Feb 1943) - off Montague Island;
- *Starr King* (Feb 1943) - off Sydney;
- *Racina* (Feb 1943) - off Cape Howe;
- *Limerick* (Apr 1943 – off Ballina)
- *Lydia M Child* (Apr 1943) - off Newcastle.

At least another eleven vessels were also attacked between 1942 and April 1943, but not sunk before the *Wollongbar* (II) incident. In total 17 vessels were attacked and sunk, with another 10 vessels damaged between 1942 and the end of 1944, with a total loss of 214 lives (Smith 2012).

c. Loss of *Wollongbar* (II)

During the wartime years, the high number of Japanese submarine sightings along the northern NSW coast region led the Federal Government to direct coastal steamers to stop carrying passengers (Cooper and Turner 2010:7). This meant that at the time of the following incident, the vessel was only carrying officers and crew, a fact that undoubtedly limited a far greater loss of life.

On 26th April 1943, the newly arrived Japanese *I* Class submarine *I-177* torpedoed the British Steamship SS *Limerick* off Ballina (near Byron Bay). A single torpedo struck the 8724 ton steamer, which took two hours to sink with the loss of two lives, but 70 of the officers and crew were saved (MHO #990).

On 26 April 1943, the SS *Wollongbar* (II) picked up the SOS distress signal from the SS *Limerick*, and proceeded to the area to assist in search, rescue and recovery operations for the vessel and any survivors. The vessel spent time searching in the area which further delayed its departure from Byron Bay. There it was loaded with a cargo of sides of bacon, sugar, cheese and 18,000 boxes of butter. In the late afternoon on 28 April 1943 (around 9pm), the vessel set sail from Byron Bay, and proceeded down the coast towards Sydney (Cooper and Turner 2010:6- 8).

By 1943, authorities had directed all shipping to sail close to the coast as possible, realising that Japanese submarines were known to be reluctant to come too close to the shore as it limited their ability to evade detection and escape should they be sighted. However, the continental shelf is closest to the mainland between Point Plomer and Crescent Head, meaning that submarine commanders could attack and dive into deeper water almost immediately at this location. In order to make up for the lost time and possibly as a result of concerns about encountering enemy craft, the vessel's Master (Captain Theodore Benson) steered the ship further out to sea to make full advantage of the Australia Eastern Current, which flowed south at a rate of up to six knots, which would speed up the journey south (Cooper and Turner 2010:7, 8, 11) The vessel was also not zigzagging at the time, and its course was recorded as "south half west" steaming at 12 kts. There was a slight North East swell and breeze but otherwise the weather was fine (NAA 1943, #484841, p 4, TOO 010233Z). Local sources suggest that Capt. Benson knew the risk of going further out to sea instead of hugging the shore closer in, and that he had prepared all the life rafts with quick release knots and loose ties so they could be released quickly in case they were attacked (Cec Radley pers comms 2019) or could float free (ANZAC Portal 2019).

At approximately 10.15 am on 29 April 1943, the vessel was steaming at full speed south in fine conditions, when it was sighted by the Commander of the Japanese *I* Class Submarine *I 180* (Captain Toshio Kusaka). The two funnels possibly gave the submarine commander the impression that this was a fast vessel with two engines, thus necessitating two torpedoes to sink the ship. On the bridge at this time were the Capt. Benson, Chief Engineer W Anderson, Chief Officer Will Mason, and Able Seaman Roy Brown. Kusaka fired two torpedoes from approximately 300 yards away which hit on the port side of the vessel, and then the submarine quickly submerged.

The first torpedo was seen by the Chief Engineer W. Anderson and was later reported by survivor Will Mason to have been fired three points forward of the beam and headed straight towards Hold No. 2. This was reinforced by Navy Office reports which said the torpedoes hit in the engine room and the Number 2 Hold (NAA 1943, #484841,p11, TOO 291025Z). Mason recalled:

> *We gazed seaward and saw a conning tower in a big swirl of water, not more than 500 yards away. A torpedo was already on its way. You could both hear and see it, as it appeared to be coming at us very erratically, jumping and zig-zagging.*
> (Daily Examiner, 22/11/1945:2)

A second torpedo was also observed by Mason as he quickly moved to the starboard side to avoid the blast, coming in at the same angle. At this stage Captain Benson disappeared below to destroy the secret code books. The others in the wheelhouse braced for the impact, which caused the vessel to break in half, with both ends rising straight up in the air as the vessel quickly sank. Mason, who was thrown into the sea, reported the bow rising vertically above him before it slid into the sea. The survivors headed for a broken, half submerged lifeboat which had the gunwale torn out (Cooper and Turner 2010: 13, 14, 15).

Mason later reported that most of the off-duty ships officers and crew were in deck cabins amidships, as they used the passenger cabins instead of the crew's quarters at the rear. This was the area between where the two torpedoes struck. Engine room Greaser Frank Emson was thrown out of the ship by the blast and was found lying across the bow of the ruined lifeboat badly scalded by burst steam pipes caused by the blast. Two other Able Seamen, Roy Brown and Pat Tehan, had also managed to get to the surface and onto a life raft after they had been dragged down by the suction of the sinking ship. Another life raft was discovered with Fireman Bert Blinkhorn, who had been blown "up the trunk way of the saddle back bunker", where he landed on a life raft without even getting wet. None of the rest of the crew escaped the vessel, resulting in the loss of 32 lives. Despite staying in the area for the next hour and half, the survivors did not find any other crew alive or bodies. The search was further complicated by the presence of thousands of cases of butter which were floating on the surface. The survivors then tried to row towards the shore before night fell (Cooper and Turner 2010: 11-13, 15, 16, 25).

Bert Blinkhorn, recalled that he was in the engine room when the first torpedo struck and managed to get out via a ladder up two flights (of decks) with the water rising rapidly behind him. On the promenade deck he saw several men trying to free a lifeboat, but he climbed onto a life raft and managed to get free of the ship. Pat Tehan was on deck when the torpedoes struck and stripped off before lowering himself into the water and swimming frantically against the undertow of the sinking ship. Frank Emson was in his deck cabin during the blast and was standing near a steampipe which broke during the explosion. Later analysis by Mike Richards revealed that it was likely that his cabin was likely over Boiler #1 (Cooper and Turner 2010: 34, 35).

The incident was observed by an American built (but Australian crewed) Catalina flying boat aircraft under the command of Captain Robert Honan, which happened to be flying close by, and although it could see the submarine disappearing below the surface, it was powerless to stop it as it was not carrying any weapons (Figure 6). The explosion was also heard by two boys playing on the beach between Pt Plomer and Crescent Head. The Catalina was flying on a routine patrol from the Brisbane River (near Sydney), and was close to Crescent Head adjacent to Kempsey, when at a height of 6000ft (1828 metres) the pilot observed through the corner of the windscreen a plume of water rising into the air further out to sea. Although they could see traces of debris and the rafts in the water, no signs of a ship were evident. The Catalina reported the incident via radio to Rathmines airbase, and requested that they land to pick up the survivors, but the request was denied as the aircraft was not suitable to land in offshore exposed swells. After additional aircraft converged on the area to hunt for the submarine, the Catalina headed to the closest harbour (Port Macquarie), where they dropped a message at the Port Office on the Wharf requesting a vessel be sent to rescue the survivors. The aircraft returned to the survivors and circled them, both to mark their location but also to protect them from the submarine returning (by hoping to scare it away) whilst waiting for the rescue vessel (Cooper and Turner 2010: 19-22).

Port Macquarie's dedicated rescue vessel at this time was the fishing boat *XLCR* (pronounced Excelsior) which was owned by the Radley family and Captained by Claude Radley (Cooper and Turner 2010:24). The 50 ft (15m) long *XLCR* was built in 1900 and purchased by Thomas Radley in 1924 (Figure 7). It was the flagship of Radley's fleet of

fishing craft and was also used to take soundings for the Maritime Services Board, and for scallop fishing (Cec Radley pers comms 2019). Further details of the *XLCR* are included in Appendix One.

Figure 6: Display of *Wollongbar* (II) incident scene at Mid North Coast Maritime Museum (Image: Brad Duncan, Heritage NSW 2019)

Figure 7: Fishing Boat *XLCR* at Hastings River (Image: Brad Duncan, Heritage NSW 2019)

The *XLCR* had been out fishing for the day and did not have a radio. Upon being advised of the sinking of the *Wollongbar* (II) after returning from its work, the *XLCR* (captained by Claude Radley, crewed by his father Thomas and his two brothers Mervin and Russell, and two other fishermen Ray Smith and Arthur Beattie), set out to sea again. Despite the peril presented to them by the presence of the enemy submarine, these fishermen risked their lives to go out to search for and rescue the survivors. The Catalina aircraft guided the *XLCR* out to the survivors, who were rescued at 3.30pm, having rowed closer to the coast, and it then continued to Rathmines Airforce base on the Central Coast just south of Newcastle (Cooper and Turner 2010: 22-24). One of the survivors, Will Mason (who had been the Captain on the SS *Kinchela* on which Claude Radley had sailed as a cabin boy - Cooper and Turner 2010:25) said to Claude when they showed up at the scene: "*I knew you would come for us, I knew it would be you*" (Cec Radley, pers comms 2019;).

Cec Radley (pers comms 2019) recalled:

> *Dad said that they* (the survivors) *were so pleased to see us as darkness was approaching and there was a light north-easter (wind) approaching. The lifeboat was low in the water, and with the darkness approaching they would have been in trouble. There was absolute glee to see them…One guy was blown out from a walkway and landed on a life raft. The Catalina directed the fishing boat to the survivors and led them right up until they sighted the lifeboat with a small sail up. They moved around the area for quite a while looking for survivors, but amongst all the 18000 boxes of butter in the area they couldn't see any heads or bodies in the water…The Wollongbar had been torpedoed fore and aft.*

The survivors were taken ashore and transferred to a make do ambulance in the shape of a utility truck usually engaged in carrying oysters. All the men were covered in crude oil which was used to fuel the boilers on the *Wollongbar* (II). The most critically injured man, Frank Emson, was transferred to the Port Macquarie Cottage Hospital after being stabilised by a doctor on the wharf and was then treated at the hospital in a bath with Lux Flakes and Gentian Violet/ permanganate of potash, whilst the other survivors were washed clean of oil by the local nurses from the Volunteer Aid Detachment. No other bodies were ever recovered from the wreck (Cooper and Turner 2010: 26-29, 33; Cec Radley pers comms 2019)

A Vought Sikorsky amphibious aircraft which had been searching for the submarine later reported that they had sighted a large debris field, two lifeboats, three life rafts and a body

tied to a life ring. The incident later led to all Catalina patrol craft being fitted with depth charges (Cooper and Turner 2010: 23).

A comprehensive outline of the history of the event is contained in Cooper and Turner (2010).

d. The Aftermath

- **Coastal Shipping Routes/ Naval Reactions**

Department of Navy (Navy Office) correspondence (available at the National Archives of Australia) provides insights into the official reactions to the sinking of the vessel at the time of the incident. It sent out an urgent message listing the place of sinking as 4 nautical miles 110° from Crescent Head, and possibly by enemy attack by submarine (NAA 1943: #484841, p 28, ref: TOO 290107z).

Reacting to the sinking of the *Wollongbar* (II) on 29 April 1943, the Navy Office despatched launches from Port Macquarie and South West Rocks to investigate the attack and patrol the area the same day (NAA 1943, #484841, p 28, ref: TOO 290107z), and issued a directive that all shipping was to avoid the inshore route north of Newcastle after that time until further advised (NAA 1943, #484841, p 28, TOO 290109z). Further reports stated that a submarine had been observed at 31.125 S, 53.07 E at 29036 Z, which had later submerged (NAA 1943, #484841, p26, 2090115/Z), and orders were given for the Australian Navy minesweeper HMAS *Ballarat* to be despatched to the area with all haste (NAA 1943, #484841, p25, TOO290129Z). The submarine was again spotted on the same day at approx. 2miles eastward of the *Wollongbar's* sinking location (NAA 1943, #484841, p 24, TOO 290137Z). The Navy sent an urgent flash warning at 0040 GMT to all their shipping, stating the "AF" position was 31° 11' S, 153° 5' E, but did not state whether this was for the Wollongbar's position of the submarine (NAA 1943, #484841,p 23, TOO 290159Z). HMAS *Ballarat* was instructed to remain in the area during the hours of darkness to carry out a search of the area and along the estimated line of drift until dawn the next day (NAA 1943, #484841,p 21, TOO 291301Z), and also to escort SS *Ulmara*, which had left Clarence River that same day (NAA 1943, #484841,p 20, TOO 291447Z).

On the same day of the incident, the Ship's Agent, The North Coast Steam Navigation Company, the Shipping Control Board, The Marine Branch, the Marine Industry Commission and the Marine Underwriters and Salvage Association were advised of the loss (NAA 1943, #484841,p18, DON 2016-10-1528) most likely bringing panic and at the very least concern amongst maritime industry officials.

HMAS *Ballarat* was instructed by the Navy Office to continue the search on 30th of April, but to continue to Brisbane for a Convoy escort duties (NAA 1943, #484841, p12, TOO 292333Z). It also reported that the *Wollongbar* (II) had been hit in the engine room and the Number 2 Hold (NAA 1943, #484841, p11, TOO 291025Z). Despite a search for survivors, HMAS *Ballarat* reported that it had found only one empty lifeboat and one raft (NAA 1943, #484841, p10, TOO 292335Z). By 30th April, little hope was held out for finding any further survivors and next of kin were about to be notified (NAA 1943, #484841, p8, DON 2026-10-1508).

On 3 May 1943, the Navy Office reversed their directive that all shipping was to avoid the inshore route North of Newcastle (NAA 1943, #484841 p 3: TOO # 30658Z), indicating that they felt the threat had since passed, and presumably normal shipping movement recommenced along the coast according to war time regulations.

- **Bravery Awards**

The crew of the *XLCR* were later awarded bravery certificates from the Royal Shipwreck and Humane Society in recognition of their outstanding valour in risking their lives to undertake the rescue (Figure 8).

Figure 8: Thomas Radleys Shipwreck Relief and Humane Society of NSW bravery award at Mid North Coast Maritime Museum (Image: Brad Duncan, Heritage NSW 2019)

Cec Radley, the son of Thomas Radley and brother to most of the rest of the crew stated that his father said that he wasn't concerned about going back out

> *My Dad used to say that they had bigger targets than him to focus on, and that they wouldn't waste a torpedo on them…"* (Cec Radley pers comms 2019).

Despite the recognition of their bravery, there was no award ceremony held for the rescuers, and according to Cec Radley (pers comms 2019):

> *Dad never made a big thing of it. It was just something they would do. They received their certificates in the post. Dad was very proud of that certificate. But Dad would help anyone out who was in trouble (at sea), even those people they didn't like…*

- **Gifts from God**

When the vessel sank, it was carrying 18000 (56lb) boxes of butter and 10 tons of bacon sides. The cargo hold hatches of the vessel were either blown off during the blast, or the side of the vessel was perforated, as for weeks after the sinking, boxes of butter were washed up along the shore.

The crew of the *XLCR* went to sea the next day to continue fishing as per usual:

> *Butter boxes were floating all around the ocean. They picked up a boat load of butter, they salvaged it and got some money for it. They filled up the boat, which filled the cool room up. The loss assessors called Dad about it, and he asked them how they found out about it. They approached him and asked him about the rescue and the salvage, and did he have any costs as a result. They awarded £5 per*

> *person for all the crew on the boat (XLCR) and £10 for compensation for damage to the boat* (caused by colliding with wreckage and butter boxes)*. £5 was a lot of bloody money back in those days!* (Cec Radley, pers comms 2019).

In the days following the tragedy, an unexpected boon occurred for the local communities in the area. Overnight, an Easterly gale had sprung up, and the debris began to wash ashore along the coast, including some of the 18000 boxes of butter which had been carried by the vessel. As this was a time when there was extensive rationing associated with the war, the sudden presence of this essential commodity was extensively welcomed by the coastal communities. Cec Radley (pers comms 2019) recalled:

> *An easterly gale came up the next night. There was no current, or just a light current running toward the Port Macquarie Beaches...and butter boxes started to get washed up on all the beaches…A few days later a rowboat was washed up on North Shore…*

Men were later directed to scour the beach to collect the boxes washing ashore, and one family alone collected 100 boxes which were picked up by the government truck and taken to the Port Macquarie Iceworks for safe keeping before being taken to the local butter factory to be reconstituted and shipped to Sydney (Cooper and Turner 2010: 41-44). Many local people declared the boxes of butter, whilst also keeping some back for themselves. People would often ask the local police who were guarding the piles of butter to look the other way whilst they helped themselves to a box (Cec Radley 2019, pers comms).

> *There was a lot of cakes in the area after that. My father would often come across them out to sea and would collect them* (the butter boxes) *and bring them in and store them in the shed at home. He would declare them to the authorities, and they would come and pick them up. But he still had a pile left in the shed. It was a gift from God… he would give it away to the Red Cross and other people who needed them in the area. The Government didn't want it. There was rationing then, and butter was very scarce (Cec Radley pers comms 2019)*

Local children also joined in the on the search for the butter, often with ulterior motives:

> *I was a kid at the time, and we would often find them on the beach, and we would have butter fights with it. We would break open the boxes and throw it* (the butter) *at each other. It would stick to your clothes and we would get a hiding from mum when we got home – our poor mum had to wash all the clothes still covered in all this butter. And she could have put it to good use at home* (Cec Radley pers comms 2019)*.*

Lumps of rotting butter were still washing ashore decades later, including a barnacle encrusted butter box in 1962 (Cooper and Turner 2010: 44; ANZAC Portal 2019).

Various other relics from the *Wollongbar* (II) which washed ashore after the wreck, are now displayed at the Mid North Coast Maritime Museum and Colonial Museums in Port Macquarie, including a life-ring (Figure 9) other components of the vessel and cargo boxes (Figure 10).

Figure 9: Life ring from *Wollongbar* (II) wreck at Mid North Coast Maritime Museum (Image: Brad Duncan, Heritage NSW)

Figure 10: Sugar box recovered from the *Wollongbar* (II) at Mid North Coast Maritime Museum (Image: Brad Duncan, Heritage NSW 2019)

- **War Paranoia**

The incident also led to a heightened awareness of the proximity of the enemy Japanese so close to home in the local coastal communities. Many people were wary of their presence, especially in isolated areas:

> *One farmer lost all his chooks, several sheep and a horse, whose remains were found butchered on the beach. They must have had a dugout observation post in the sand hills and were watching the farm waiting for the farmer to leave so they could help themselves* (Cec Radley pers comms 2019).

There were also reports of fishermen seeing strange lights offshore close to dawn, but when daylight came there were no vessels evident. Some fishermen also saw water current trails from submarines and disappearing periscopes (Cec Radley pers comms 2019). This led to a heightened awareness of the threat of Japanese presence amongst some families in the area:

> *Everyone was worried as they knew they* (the Japanese) *were out there. We were scared. I used to go to the shed at Flagstaff Hill where I assisted as a spotter to look out for any signs of the Japanese. The little shed had charts of cloud formations, and plane types and ship shapes…we would report planes down to Melbourne. I did this with my aunty. Mum was nervous about the Japanese coming when the Wollongbar was torpedoed. They were very close. One night we woke up thinking the Japanese had arrived as there was this thrumming coming from over the bar, which turned out to be an American vessel* (Shirley Radley, pers comms 2019)

Others such as the fishermen did not worry about the Japanese presence and were blasé about the potential risk:

> *My dad often didn't report things* (sightings of Japanese submarines) *to the authorities as he didn't want to stir things up. He once said in passing that he saw a sub on the surface. They* (the submarines) *were patrolling the seaboard all the time*

and were often recharging their batteries on the surface (Cec Radley pers comms 2019).

- **Historical Location of the Wreck**

Contemporary historical reports listed the place of sinking as 4 nautical miles 110° from Crescent Head (NAA 1943: #484841, p 28, ref: TOO 290107z). The location of the wreck may have been later confused in official correspondence when it was stated by the Secretary of Defence that the vessel had sunk 4 miles from Port Macquarie (NAA 1943, #484841, p19, DON 2026-101509)

Other Navy Office reports stated that the wreck sank 80 miles north of Newcastle (NAA 1943, #484841, p9, TOO 301131Z) or 8 – 12 miles off the coast (NAA 1943, #484841, p 4, TOO 010233Z).

The precision of position fixing at this time was often constrained due to the distance off the coast, accuracy of instruments (in particular onboard compasses on shipping and aircraft), and wartime secrecy provisions.

3. BACKGROUND

a. Discovery

Rumours that the wreck of the *Wollongbar* (II), or another previously unidentified wreck, had been discovered reached Heritage NSW in May 2019. The site was suspected to be a wreck, after several local fishermen had inadvertently pulled pieces of timber and steel to the surface when fishing at a sonar anomaly in the area. The wreck was reportedly discovered by local fisherman Brett McKinnon in 2014.

> *I have been a Professional fisherman for 10 years. We had been going there for about 12 years and we fished it on a regular basis, but it has been subject to increasing commercial and recreational fishing pressure in recent times. One day we pulled up an iron stained plank, but when I tried to get it, it fell off the hook and also a piece of steel. As soon as we found that we knew what it was. It was probably the Wollongbar, as there was nothing else out there…* (McKinnon pers comms 2020).

Another fisherman recalled his experience that first made him think the fishing site was a wreck.

> *We had been going there for about eight years until we realised what it was, until we started pulling up bits and pieces which is what made us stop fishing there – we realised that it was a wreck after we saw metal stains on some timber that we pulled up on the end of the line…*(Anonymous 2020)

The wreck acts as a fish aggregation device, which attracts fish to the locality:

> *It is a good fishing mark as there is not a lot of other structure out there. Without structure there are no fish – fishermen are always looking for good structure that attract fish species at that depth, such as pearl perch and snapper which are popular with recreational fishermen. The site is not fished by most charter vessels as it is a fair distance for charter vessels to travel* [from Port Macquarie] (Todd Adamson pers comms 2020)

Only a few local Port Macquarie area fishermen appear to have known the location of the wreck for a few years, as there are few pinnacles in the area, and it attracts economic fish species such as jewfish to it (Cec Radley pers comms 2019).

Some fishermen and local mariners also expressed concern about the number of people fishing the wreck, its importance as a grave site and whether fishing should be allowed in the area. McKinnon (pers comms 2019), the finder of the wreck, reported that he did not disclose the location to the wider community as he suspected it might be the wreck of the *Wollongbar* (II) and wanted the site respected.

This sentiment was reiterated by other local mariners, including some in the fishing and fishing charter industries, who regarded the wreck as a war grave and that it should be treated with respect and ideally left alone.

Some local mariners also reported that the site is now being actively overfished compared with previous years once its location had become generally known in the local community in the last 12 months, and that it was now being fished by up to sixty people at a time. Many local mariners were concerned that this was placing undue pressure on the wreck and its resident fish population (potentially not sustainable), and that there were plenty of other locations to fish in the area which might be used instead. As a result, many of the local

mariners and local Port Macquarie community consulted during preparation indicated that they would prefer the site closed to fishing and other forms of visitation.

b. Location of the wreck

The military location for the incident was extracted from a wartime diary of the Commander of the Seventh Fleet (NARA # 4697018, 30 Apr 1943: 464) and was given as:

- 31° 17' S, 153° 7' E.

This position is located almost 8.3km south south east of the actual inspected location, and 13.5km south east of the maritime heritage database location.

The NSW Maritime Heritage Database and NSW Shipwreck Atlas (1996) listed the location for the *Wollongbar* (II) as:

- 31° 10.461', 153° 2.877'

This location, which is based on the descriptive historical position, which was widely reported at the time, is approximately 6.62km (3.56 Nm) north west of the actual final reported and verified location of the wreck site.

The first recent site discovery report from 2019 specified the location as being approximately 11.7 km (6.32 Nm) off Crescent Head, in 92m of water.

The initial location position by local fishermen was:

-31˚ 12.585', 153 ˚ 06.220'

Later more accurate coordinates were submitted as being:

-31 ˚ 12.5665', 153 ˚ 06.220' (north section - stern) WGS84 datum

-31 ˚ 12.593', 153 ˚ 06.219' (south section - bow)

Maritime historian and researcher Peter Taylor (2013:11) had previously investigated whether non-submarine echoes could indicate the presence of previously unknown shipwrecks. During WWII, the Australian and allied navies equipped with an ASDIC sonar often undertook surveys to investigate the possible presence of submarines off the Australian coastline, whereby sonar was used to 'ping' targets to determine if they were enemy submarines (or not). To help prevent the unnecessary use of depth charges, where the targets were determined not to be submarines, they were recorded as non-submarine echoes (also known as *non-sub echoes*). This information was forwarded to the Hydrographic Office for recording and publication in *Fleet Notices to Mariners* which were forwarded to all RAN vessels. This information was successfully used by Taylor (2013) to discover the location of several sunken vessels in Bass Strait.

Taylor provided a list of these locations to the current author in 2009, who generated a GIS layer of them around the country (Duncan 2010). It should be noted that there were limitations on plotting the location of sites at sea during these periods, and that the accuracy is not of the same standard used today, hence the sites are indicative of a general location only.

There are two known non-submarine echo locations close to the locations provided by the local community, which are about 50m apart (Figure 12). It is possible, especially given the

proximity of the known wreck site (about 1.3km to NW target, and 1.7km to the SW target) and the inaccuracies of charting due to the limitations of technology at that time, that these anomalies are of the actual wreck site when discovered in 1944; OR that they may be pieces of the original vessel broken off during the wrecking event. Further investigation of these locations is recommended.

On 23 July 2019, Heritage NSW maritime archaeologists, Dr Brad Duncan and Mr Stirling Smith, undertook fieldwork out of South West Rocks to inspect a possible shipwreck reported by the local fishermen and community members.

The site reports specified that based on echosounder data, the wreck was lying in two pieces approximately 54m apart, with one section standing 6m above the seabed and a scattered debris field surround the two sections.

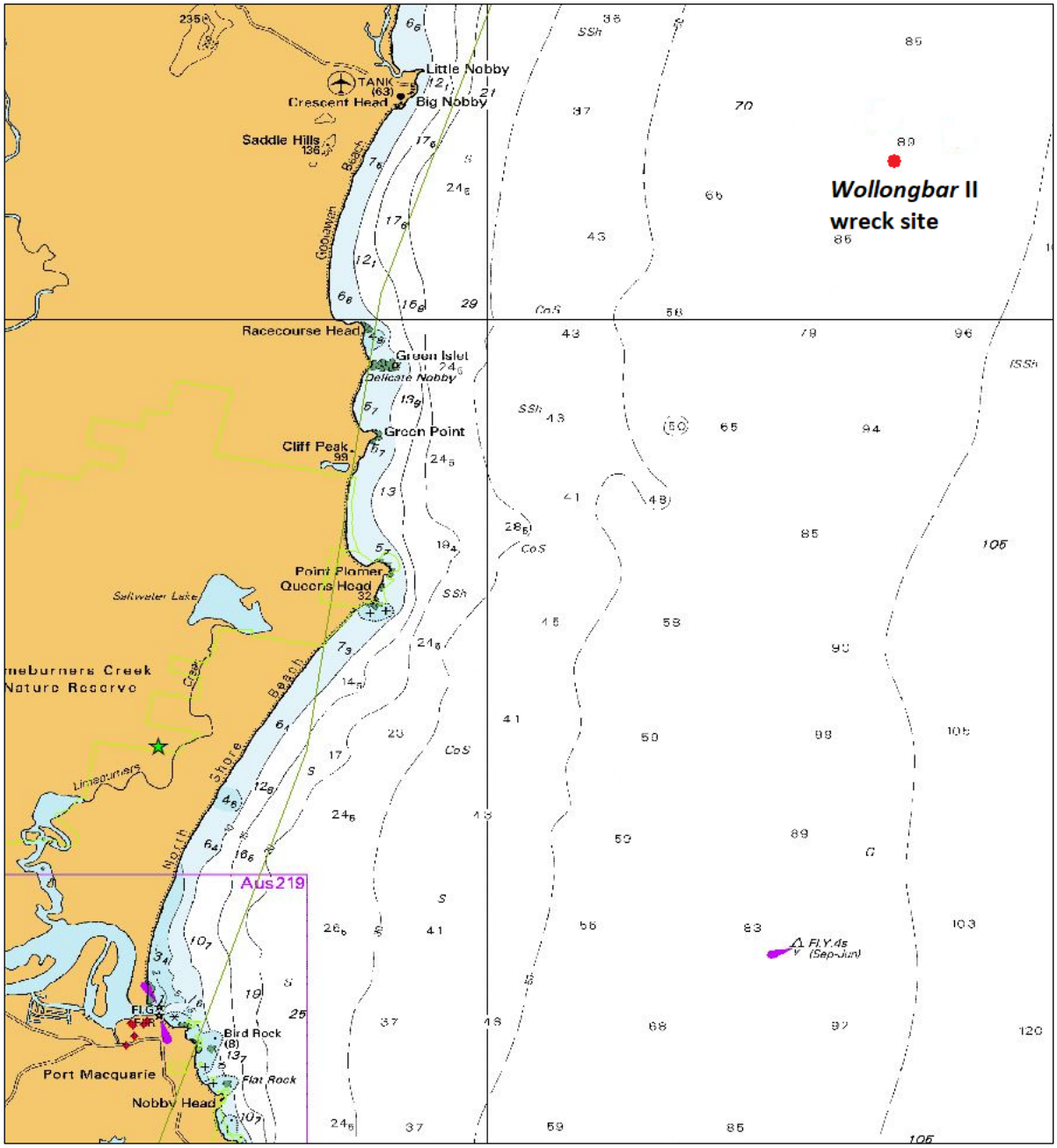

Figure 11: Location of wreck off Crescent Head – shown in red circle (Image after AUS Chart 811)

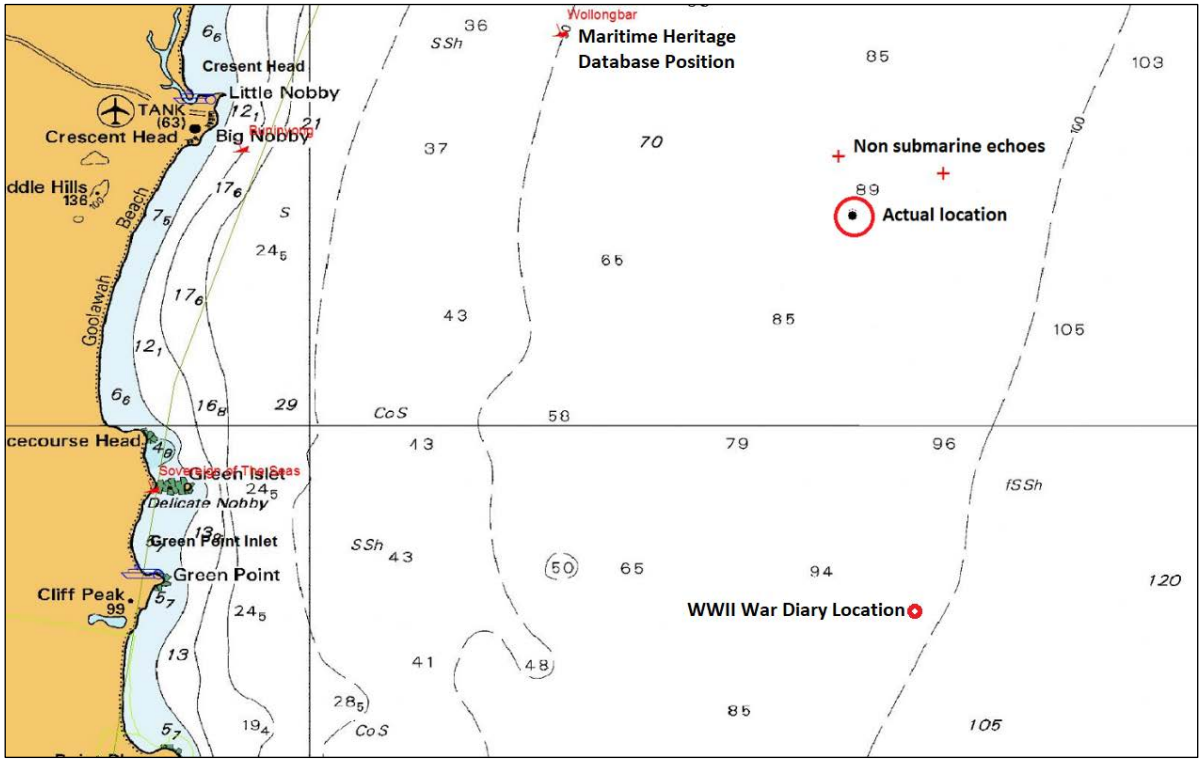

Figure 12: Location of wreck site showing the reported historical WWII location, maritime heritage database and actual locations of the wreck. Note also the non-submarine echo locations shown as red crosses (Image: After Aus Chart 811)

Figure 13: View to the north from the site of the *Wollongbar* (II) wreck showing Hat Head and Hungry Hill (Image: Brad Duncan, Heritage NSW)

Site inspections were carried out both from South West Rocks and Port Macquarie, dependent on support vessel availability.

4. AIMS

The aims of the inspection were:

- To inspect an Unidentified wreck off Crescent Head to determine:
    - its exact location;
    - its specifications length/ breadth; condition and extent using multibeam remote sensing imagery.
- To inspect the site using an ROV video camera for diagnostic features which might help identification of the vessel and specifically whether it is likely to be the wreck of coastal freighter SS *Wollongbar* (II), known to have sunk off Crescent Head NSW after being torpedoed by a Japanese I Class submarine in 1943;
- To examine the environmental conditions of the wreck site including any natural or cultural site formation processes which may be affecting the condition of the wreck and/or any associated debris field;
- To determine if the wreck is at risk of further damage from natural or cultural processes, and to provide guidance for further management of the site; and
- To inform management recommendations for the site, including the protection of any human remains.

5. METHODOLOGY

a. Historical Information

Historical research was undertaken prior to the survey to try to source historical photographs of the ship or construction plans, and relics from the wreck. Sources consulted included:

- Lloyds London (Insurance Agency);
- Australian National Maritime Museum;
- UK National Maritime Museum Archive of Plans;
- Australian War Memorial;
- National Archives of Australia;
- Australian Naval Heritage Centre/ Navy Heritage Collections (Royal Australian Navy);
- Seapower Centre, Canberra;
- Maritime Museum of Tasmania;
- Ballina Naval and Maritime Museum;
- Lithgows of Port Glasgow Shipbuilder Collection;
- Mid North Coast Maritime Museum;
- Powerhouse Museum;
- Caledonian Maritime Research Trust;
- Heritage NSW Maritime Heritage Database and Research Archive.

Official wartime correspondence relating to the vessel and the torpedo incident were accessed from the National Archives of Australia which were held at the North Melbourne depository. These records included the files based on:

- The sinking event (NAA 1943, # 484841);
- Defensive mounting of guns on the vessel (NAA 1942, # 5941087);
- The installation and maintenance of paravane equipment (NAA 1941, # 5947772; NAA 1942, # 5931142; NAA 1941, # 5947774; NAA 1942, # 5931056; NAA: MP150/1, 674/206/575); and
- Deperming of the vessel (NAA 1942, # 5940002);

Although further files were available at the National Archives of Australia, limitations on file access numbers limited the number of files that could be accessed at any one time.

When referencing National Archives of Australia files, the following convention has been used: (NAA / Barcode # of file / Page # in file / Correspondence Reference # on Page).

Cooper and Turner (2010) provided a relatively comprehensive history of the wrecking incident which is quoted extensively in this report. Marcus (1986) provided a comprehensive background history to the history of Defensively Equipped Maritime Ships (DEMS) in Australia.

Both Mid North Coast Maritime Museum and Powerhouse Museum both have half models of the *Wollongbar* (II) in their collection, and these were used for comparative purposes when identifying components of the vessel which were identified on the wreck. This was especially useful as no original plans of the *Wollongbar* (II) could be located at the time of the survey.

The National Library of Australia *Trove* research site was also used to access contemporary newspaper accounts of the incident.

b. Underwater Inspection

The following methodology was used to record the wreck site.

ROV Photography

Extensive underwater video recording was undertaken for the site from many different angles, for later processing using photogrammetric software (see below). Stills from the video footage were extracted using the video render function in Adobe Photoshop Elements 14 or Snipping software or using Microsoft Snipping application.

Photogrammetry

Multiple photographic still images were taken of half ship models of the *Wollongbar* (II) that were part of the collections of the Mid North Coast Museum, and the Museum for Applied Arts and Science. These images were then processed using Agisoft Metashape Professional software (v. 1.5.4 build 8885 version) to generate photogrammetric representations which were used to assist in identification of key features found onsite.

Where photogrammetry recording was undertaken using underwater footage, photographic images were processed using Agisoft Metashape Professional software (v. 1.5.4 build 8885 version). The point cloud layers, and 3 dimensional models generated were used to produce basic site plans where possible.

Assistance was also sought from the Hub for Immersive Visualisation and eResearch (HIVE) Centre at Curtin University to produce more detailed 3D photogrammetric model of the site. The HIVE has produced detailed photogrammetric interpretation of the HMAS *Sydney* and HSK *Kormoran* wrecks located off Carnarvon in Western Australia.

c. Oral Histories

Community knowledge is often valuable in identifying the history of each area and the presence and location of (often) previously unreported heritage sites There may also be detailed local accounts about the associated events which contributed to the site's formation.

An interview was undertaken with a relative of the family members of the rescuers of the *Wollongbar* (II) survivors who was located in Port Macquarie. Cecil (Cec) Radley is the son of the Thomas Radley (former captain of the *XLCR*), and three of his brothers (Claude (Captain of *XLCR*), Mervyn and Russell) also formed part of the crew. Cec is now the only surviving family member, and he holds the family recollections of the *Wollongbar* (II) rescue. He and his wife Shirley spoke about the event and its effect on the community at the time (Figure 14).

Figure 14: Cec and Shirley Radley hold the bravery award of Thomas Radley, Captain of the rescue vessel *XLCR* (Image: Brad Duncan, Heritage NSW)

d. Logistics

The inspection of the site was based around favourable wind, tide and swell conditions, as the area is in an exposed location and can be subject to strong winds and tides, as well as large seas and swell. A very strong current was experienced on both visits to the site of between 2-5 knots from the north. Currents across the site are supposed to be at their least in the period from May – July, but seasonal and local variations make tidal flows across the site difficult to predict.

On 23 July 2019, an initial Government inspection of the site was undertaken using multibeam sonar technology. Transport and surface support were supplied by Todd Adamson, RMS Boating Safety Officer, North Area – Maritime Operations and Compliance, now Transport for New South Wales (TfNSW - Figure 15).

On 25 September 2019, further fieldwork was undertaken using a private commercial vessel hired locally from *Fish Port Macquarie* (fishing charters) which was funded by Heritage NSW and the Commonwealth Historic Shipwrecks Program. Their vessel: *Nitro* (Figure 16) is a 11.75m long Cougarcat type catamaran commercially registered as a fishing charter boat. The vessel was equipped with twin internal Yanmar engines (which increased manoeuvrability) and was equipped with its own internal GPS system and echosounder.

Figure 15: RMS Vessel at South West Rocks (Image: Brad Duncan, Heritage NSW)

Figure 16: Fish Port Macquarie charter vessel *Nitro* (Image Brad Duncan, Heritage NSW 2019)

e. Remote Sensing: Multibeam Survey: 23 July 2019

An initial investigative survey of the reported wreck site to confirm it's location, scale and orientation was organised using underwater remote sensing company AUS-ROV (Alex and Adrian Jahnke and Damian Mullaney). AUS ROV provided a Norbit Oceanmaster iWBMS multibeam sonar system, which uses multi-frequency sonic waves to build a picture of submerged objects. Due to the depth, the survey lanes were spaced approximately 50m apart to provide adequate coverage. Strong currents associated with the Eastern Australian Current were running north to south (4knts +) added to the complexity of the survey, as the survey vessel struggled to move forward at low speed moving south to north but moved at great speed in the opposite direction. A wider survey of the surrounding area was also undertaken using a wider survey swath, which was set to a 750m, but the water depth led to only 250m of this run being usable as the feedback deteriorated after this distance out from the multi-beam unit. The unit was mounted at the bottom of a pole attached to the boat, with twin RTK GPS antennas mounted at the top (used to calculate position movement and location accurately within a few millimetres), and pitch, yaw and roll calculated within the multibeam unit underwater at the base of the pole (Figure 17). Data was processed using *Hypack* hydrographic survey acquisition software.

An acoustic water density meter (Figure 18) was used to measure different water layer densities that might affect the multi-beam's reading, which could then be auto-corrected in the multi-beam interpretation.

Figure 17: Installing multibeam sonar head and GPS correction antenna mast (Image: Brad Duncan, Heritage NSW 2019)

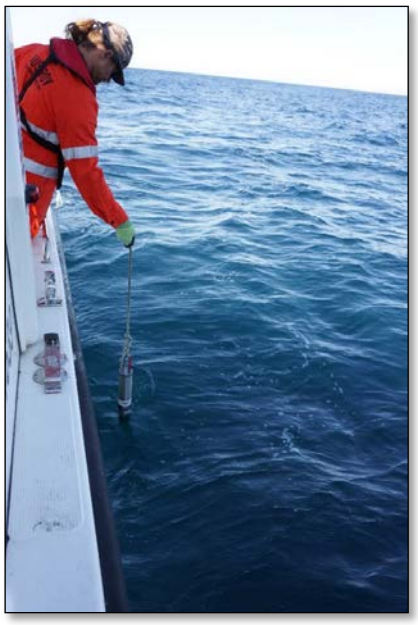

Figure 18: Lowering acoustic water layer density meter (Image: Brad Duncan, Heritage NSW 2019)

f. ROV Inspection 25 September 2019:

Once the position of the wreck had been confirmed, with its extent understood, Heritage NSW initiated a Remotely Operated Vehicle (ROV) camera survey to obtain a more detailed understanding of the wreck components and characteristics. This was undertaken using a SeaBotix VLBV300 ROV (Figure 19). The ROV unit had an omni-directional sidescan sonar mounted on the top of the unit for guiding it underwater to the wreck site which can be monitoring by the operator on deck (Figure 20). The unit was launched from the rear of the vessel and weighted down with approx. 50kg of weights attached to the umbilical cable to get the ROV to sink despite the 5 knt current (Figure 21). In addition to the built-in camera used for visually monitoring location and water depth onsite, a HD Paralenz video camera (Figure 22) which was pressure rated to 200m) was mounted on the side of the unit to take high quality video footage of the site. Footage was processed using Hypack acquisition software and compared to historical images of the vessel to help guide the inspection (Figure 23).

Figure 19: Alexander Jahnke (AUS ROV) preparing the ROV for deployment. Note the sidescan unit protruding from the top of the ROV unit (Image Brad Duncan, Heritage NSW 2019)

Figure 20: Adrian Jahnke (AUS ROV) operating the ROV topside (Image Brad Duncan, Heritage NSW 2019)

Figure 21: Alexander Jahnke (AUS ROV) deploying the ROV onsite (Image Brad Duncan, Heritage NSW 2019)

Figure 22: Parlenz underwater video camera (Image: Brad Duncan, Heritage Division 2019)

Figure 23: Adrian Jahnke (AUS ROV) and Brad Duncan (Heritage NSW) comparing the live ROV footage from the wreck site and with the half ships model (Image: Alex Jahnke, AUS ROV)

g. Identification of the wreck

After gathering of data from video and stills footage of the wreck, individual features within the site were identified and compared to known photographs and images of the *Wollongbar* (II) for comparative analysis. Two half ships models of the *Wollongbar* (II) were located at the Museum of Applied Arts and Sciences (MAAS) and the Mid North Coast Maritime Museum. These models were produced when the ship was being built and presented to the owners after the vessel was launched. As such they are accurate as built models of the vessel at the time that the ship was completed. Photographs of the half ships model at the MAAS (Figure 24) were initially used to identify key features on the wreck site. Later the model at the Mid North Coast Maritime Museum was extensively photographed for comparative analysis of the known components of the vessel with features observed at the unidentified shipwreck site.

Figure 24: *Wollongbar* (II) half ships model at Museum of Applied Arts and Science Collection (Image: © Museum of Applied Arts and Science Collection).

6. SITE INSPECTIONS: RESULTS

a. Fieldwork 23 July 2019.

The location of the second set of marks provided proved to be 100% accurate. Initial onsite inspection of the site revealed two sections of the wreck which appeared to be lying in a line, suggesting that the wreck has collapsed in the midships section. Initial measurements of the site based on echo sounder readouts indicated that the wreck was approximately 80 m long x 13 m wide (Figure 25). The northern section of the wreck stood about 6m above the seabed, with either a bait ball of fish or possibly a net evident from the 65-80m mark above the wreck (Figure 26). A strong current was observed on the site, running roughly north to south, and up to 5 knots.

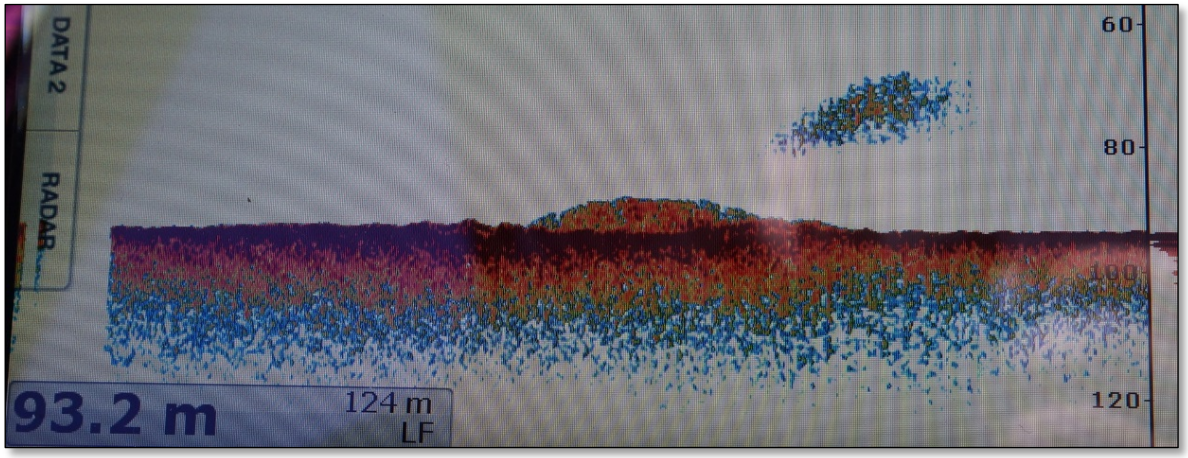

Figure 25: Echo sounder image of the site north to left of image (Image: Brad Duncan, Heritage NSW 2019)

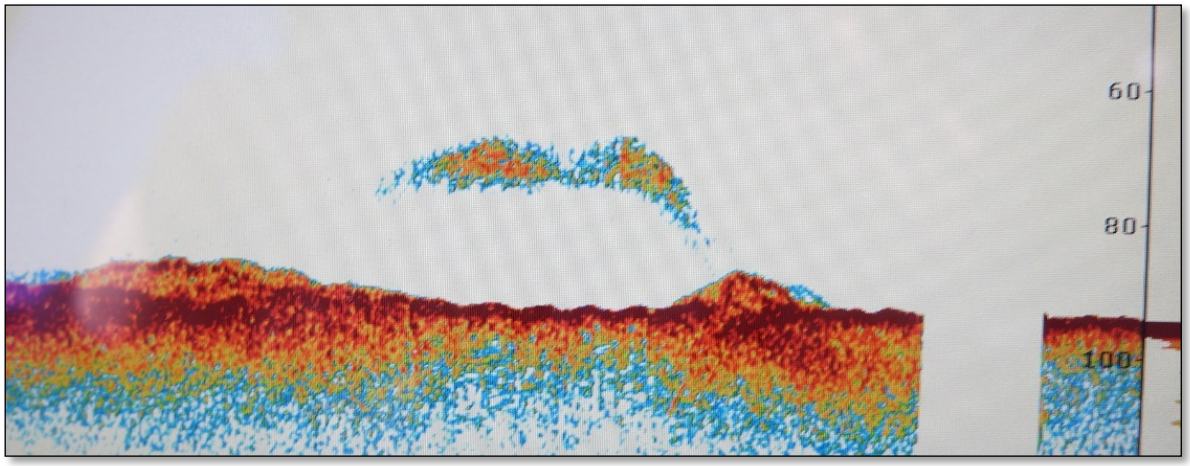

Figure 26: Echosounder view of wreck. Left side travelling north to south and then side view from south as the boat turns around. Note the bait ball or possible net hovering at approx. 65-80m mark above the site in a southerly direction (Image: Brad Duncan, Heritage NSW 2019)

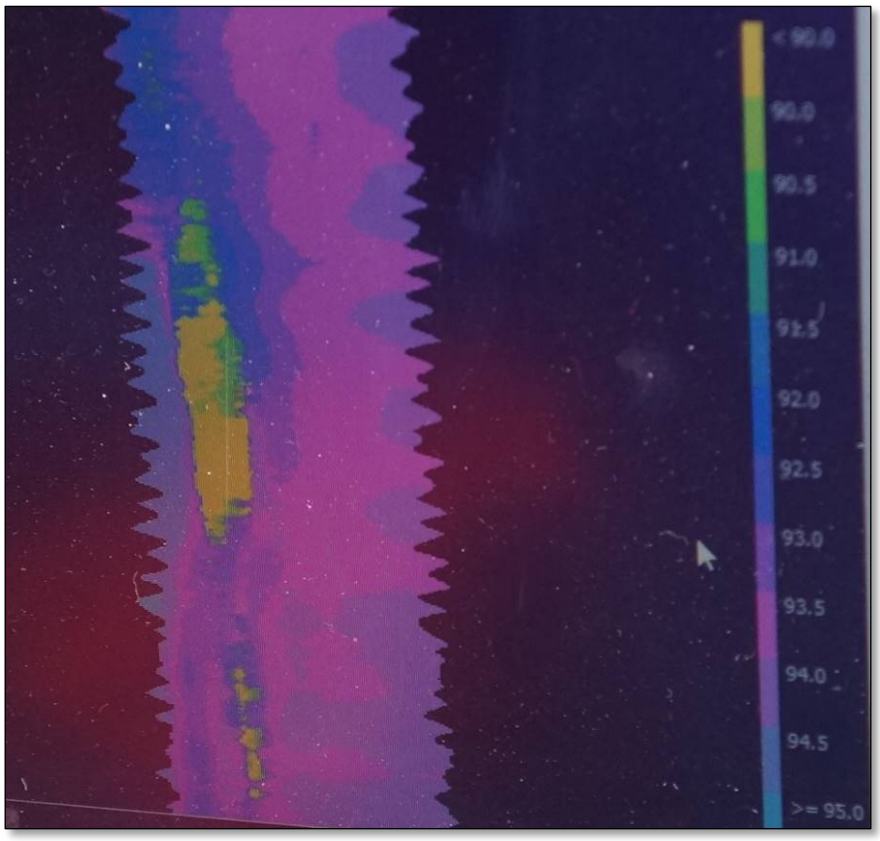

Figure 27: Initial multibeam survey results of the site, north at the top of the image (Image: Brad Duncan, Heritage)

Following postprocessing of the multibeam data (Figure 28), it became clear that the anomaly was lying approximately in a North/ South alignment with an accretion of sediment on the northern side, and scouring at the southern end up to approx. 10m past the southern extremity of the feature.

The anomaly evidenced a solid but probably buried section in the northern end of the site. Approx. 15m to the south, a large, elevated section 13m wide and c 6m high (in places) extended for a distance of approx. 35m to where it again tapered off and appeared to be partially buried. Approximately 12m south of this point, the anomaly again rises to a height of c 2m, and extends for c. 13m, where it tapered to a point.

The distance from the hard northern edge of the site (show in Figure 29 in yellow) to the southern tapered edge was 82m long with a maximum width of approximately 13.2m.

The features were predominantly linear, although the southern extremity was slightly offset to the east. Initial interpretations of this anomaly suggested it was a ship based on its shape.

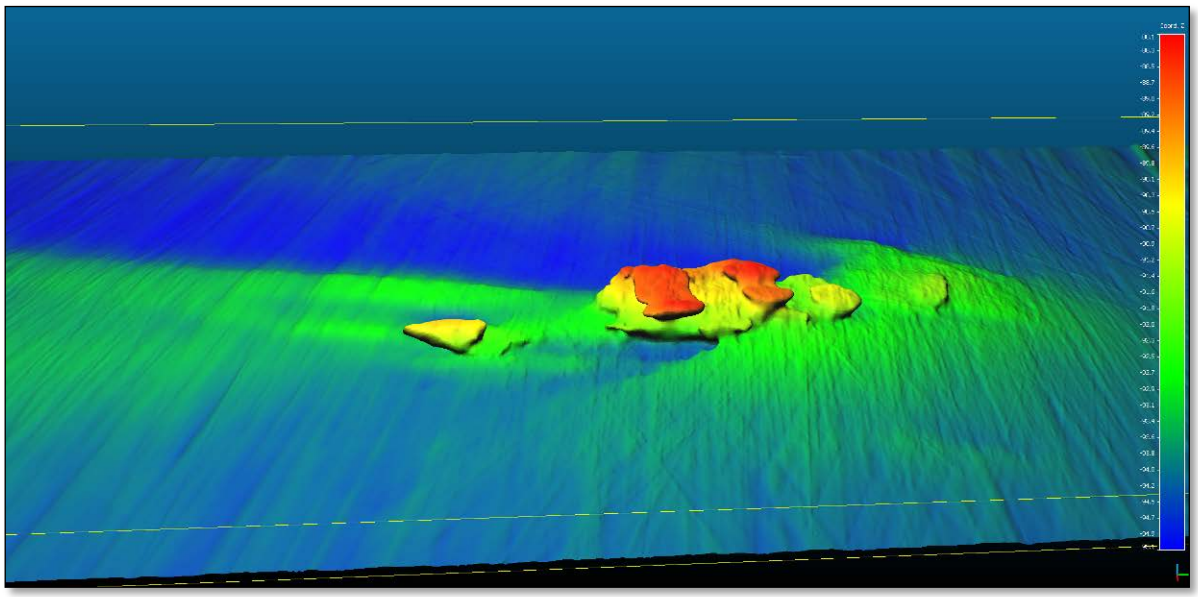

Figure 28: Post processed multibeam data of the wreck site with bow on left and stern on the right (Image: AUS ROV 2019)

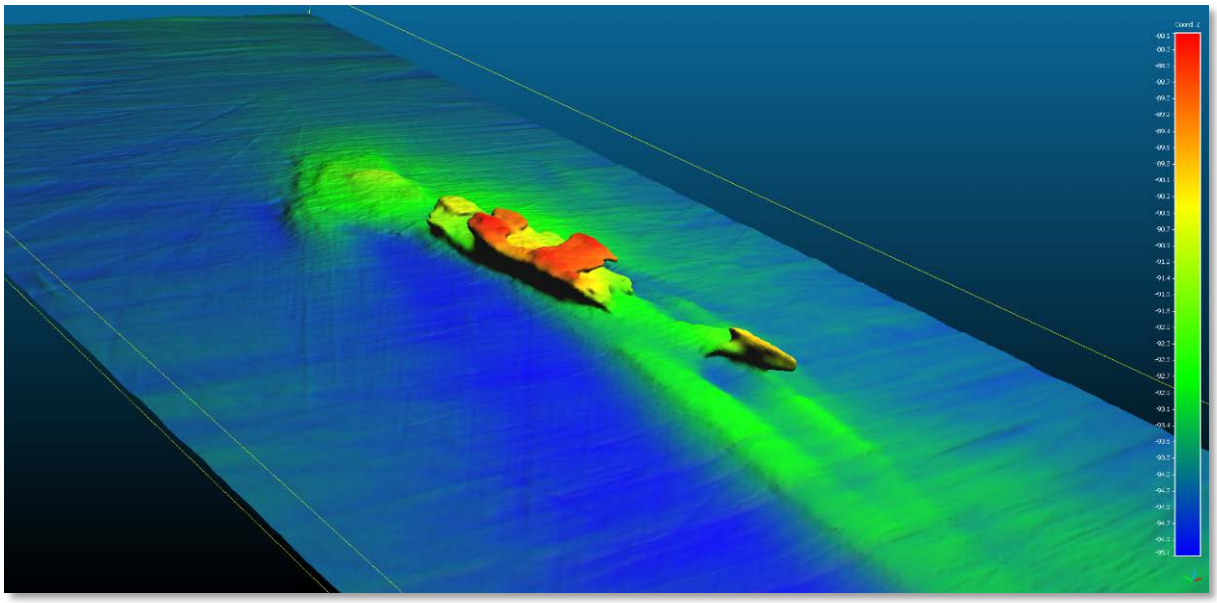

Figure 29: Processed multibeam data of the wreck site showing signs of damage aft of the bow on right and at the stern on left (Image: AUS ROV 2019)

b. Fieldwork: 25 September 2019

An inspection of the site with the ROV confirmed the anomaly was indeed a shipwreck of at least 82m length and approx. 13m wide.

Bow section

Starting at the southern extremity, a section of a plumb bow with localised scouring underneath. The bow lies canted at a 45 degree angle to port. The stem has been torn from the supporting steel structure in this area, leaving behind the flat section of "U" channel bar/frame reinforcing into which the stem would be mounted (Figure 30; Figure 31). The rounded lower section of the stem is intact just above the intact hull plating and extends down to where it connects to the keel. The foot (lowest section) of the bow appears to have been subject to toe scouring, particularly on the starboard side.

The upper hull structure, including the frames, beams, decking, and side plating for the forecastle structure is missing (and has probably collapsed over to the port side). This observation is further supported by the stump of a single cant frame of the forecastle structure protruding above the deck on the starboard side. The upper hull plating on the starboard side is missing, exposing the frames and lower deck beams and stringer angle lugs (used to support the lower deck). There is no evidence of the hawse pipes in the upright section of the starboard side (where the anchor would be hung from the anchor chain), reinforcing the theory that the forecastle section has collapsed (Figure 32). This is supported by the presence of tubes/ pipes which may be hawse pipes and/or ventilators or ventilator tubes that lie on the port side of the upright bow section (see Figure 33), suggesting that the visible decked area on the upright bow forms part of the main deck.

There are obvious signs of fracturing on the starboard side of the bow approx. 5m back from the stem, which may have been caused by the bow hitting the seabed or the torpedo explosion (or both). A square box like structure of unknown purpose is located on the main deck at the deck-hook end of the bow, and may be a navigational running light (Figure 33).

Figure 30: Bow of the *Wollongbar* (II) from the port side. Note the stem has been peeled off leaving only a "U" section girder (Image: AUS ROV 2019)

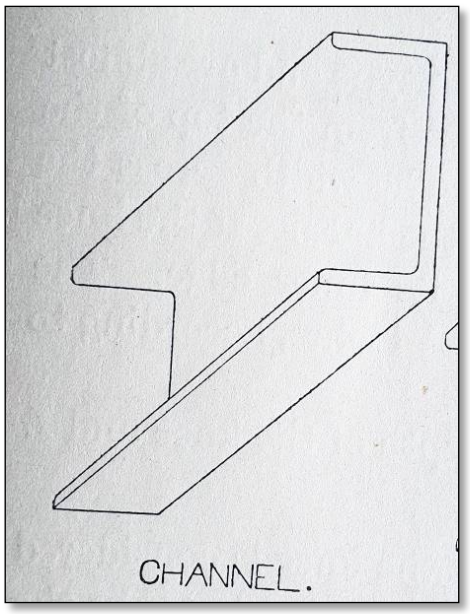

Figure 31: Channel Bar similar to that evident at the stem in the bow (Pursey 1948: 49)

Figure 32: Bow showing loss of hull plating and stringers/ lugs (1) and lack of evidence of the hawse pipe. Note the stem (2) has been peeled off on the extreme right (Image: AUS ROV 2019)

Figure 33: Bow showing detached stem post/ channel bar (1), collapsed focsle frames (2), possible navigational running light (3); and detached hawse pipes and/ or ventilator tubes (4) (Image: AUS ROV 2019)

A windlass is located just aft of the hawseholes/ventilator tubes on the port side of the bow. It consists of at least one set of cable lifters, 1 set spur wheels, and a brake wheel handle (Figure 34). This is most likely a steam windlass that would have been mounted on the foredeck of the forecastle, as shown in Figure 35.

Figure 34: Windlass, showing the cable lifters (1) brake wheel (2) (Image: AUS ROV 2019)

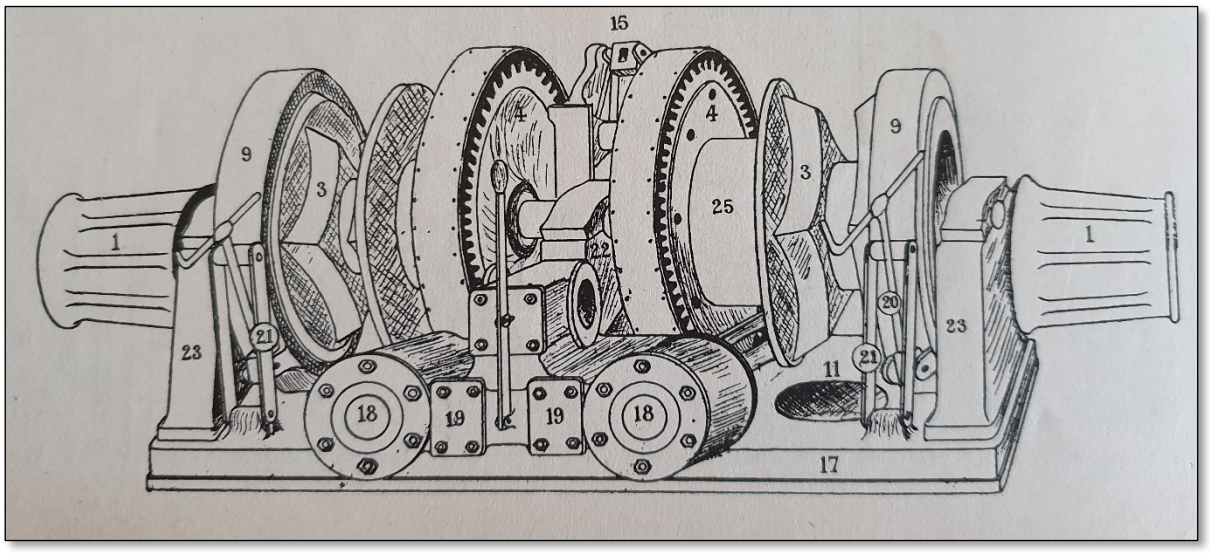

Figure 35: Steam Windlass, showing cable lifters (3) and brake wheel (20) in plan (Image: Bataille and Brunet, 1937: Plate 94)

The remains of what is probably the forecastle or focsle deck lie scattered on top of and adjacent to the intact main section of the bow on the port side (Figure 36). Figure 37 shows a historical model of comparable foredeck setup. The remains of a winch with two warping ends and a pinion wheel is located just aft of the intact bow section. It lies partially under a collapsed mast or derrick crane (Figure 38). The remains of what is probably a ventilator tube lie almost beneath the warping ends of the winch (Figure 39). Figure 40 shows a historical representation of a steam winch.

Figure 36: View of collapsed foredeck at bow from aft, showing bitts (1), boatswains locker box of spares (2), windlass (3), derrick winch (4) and anchor (5) (Image: AUS ROV 2019)

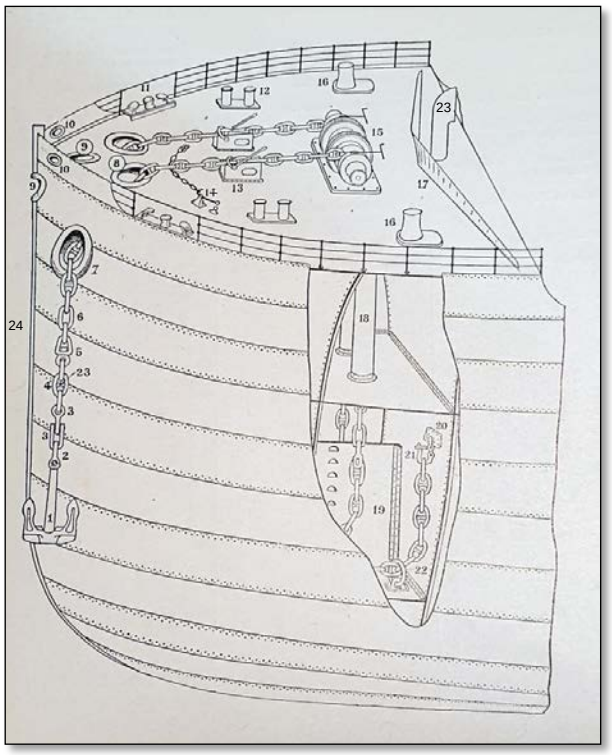

Figure 37: Bow of contemporary freighter showing position of deck furniture and equipment including hawsehole (7), bitts (12), windlass (17) hawsepipe (18), ventilator tube (23) and stem (24) (Image: Bataille and Brunet, 1937:60)

Figure 38: Bow showing collapsed foredeck with locker box of spares (1), derrick crane winch (2), derrick crane mast (3) and anchor (4). Note porthole in middle of the box which is probably storage box associated with the foredeck locker and/or boatswains locker (Image: AUS ROV 2019)

Figure 39: Steam derrick winch (1) and ventilator tube (2) (Image: AUS ROV)

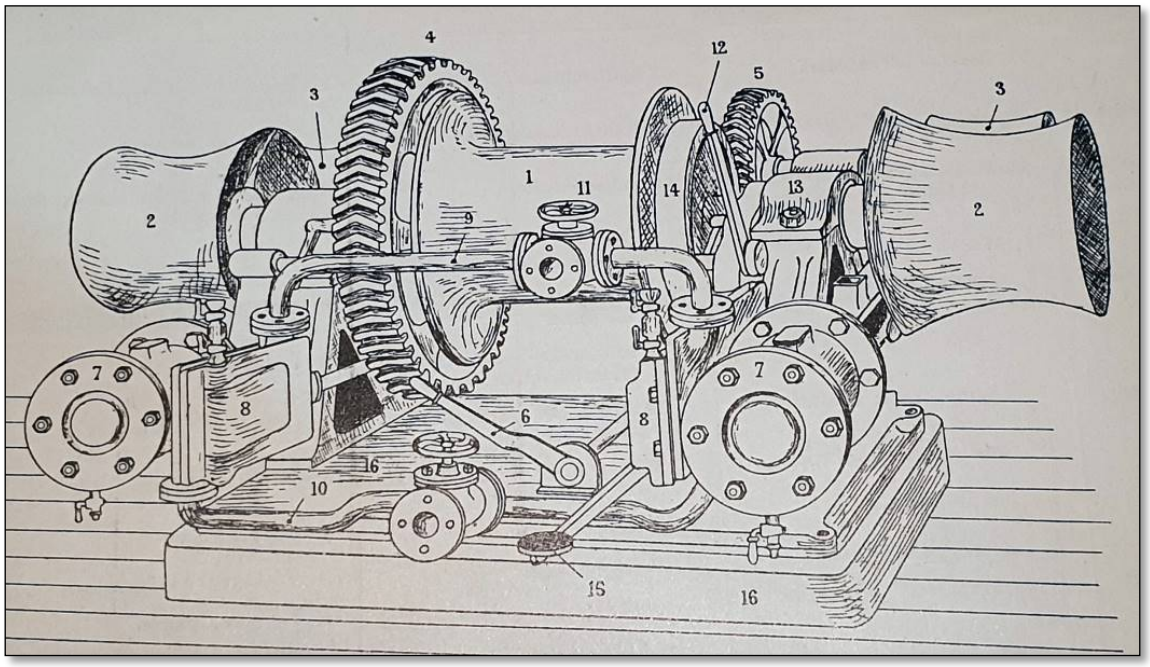

Figure 40: Steam winch showing the warping ends (2 & 3) (Image: Bataille and Brunet, 1937: 96)

Directly to the east of the of the warping ends of the winch is the outline of a square structure with the remains of miscellanious materials, including what appears to be a porthole, and possibly wire and chain (Figure 41). This may be a box associated with

operation of the winch or storage of day to day items/ spares below the foredeck for use as required, or may be a box from the bosuns locker.

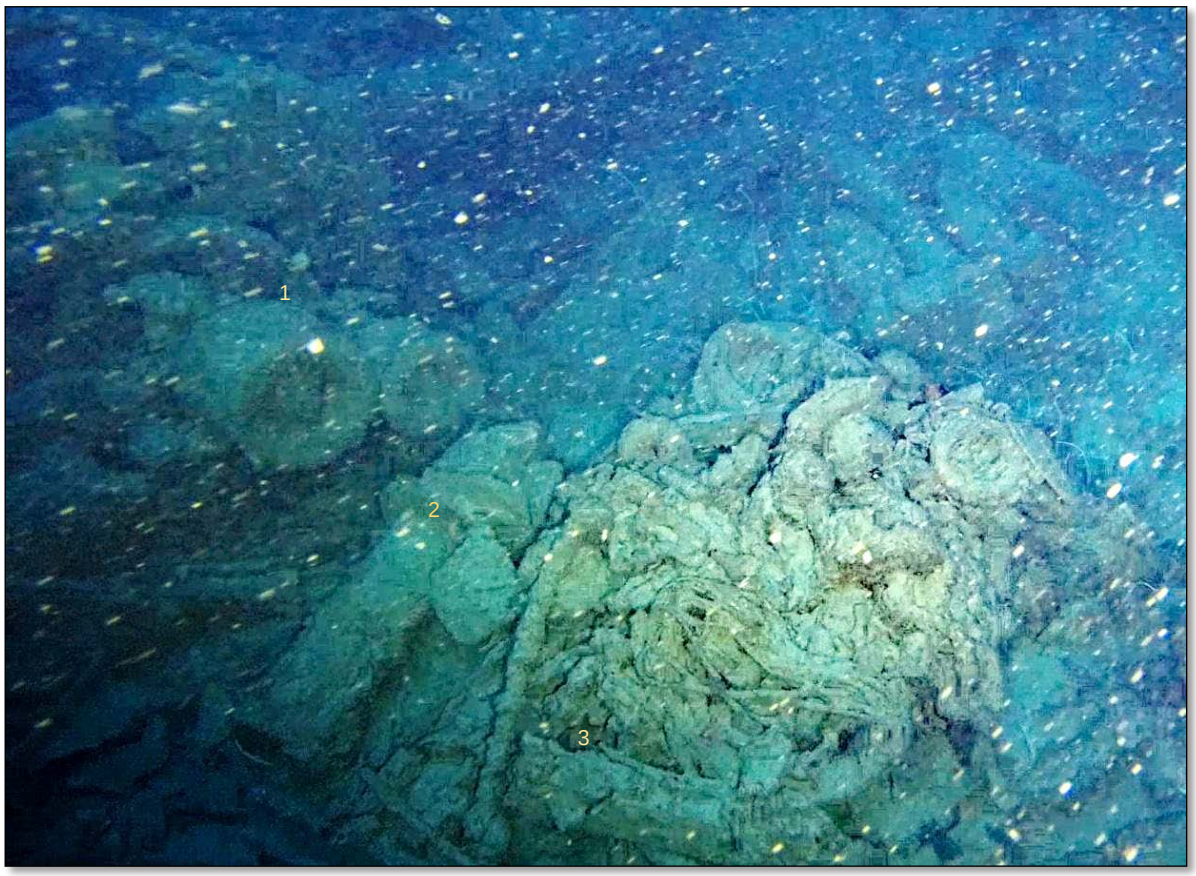

Figure 41: Winch (1), ventilator (2) and remains of bosun's locker equipment box (3) with cable chain and portholes (Image: AUS ROV 2019)

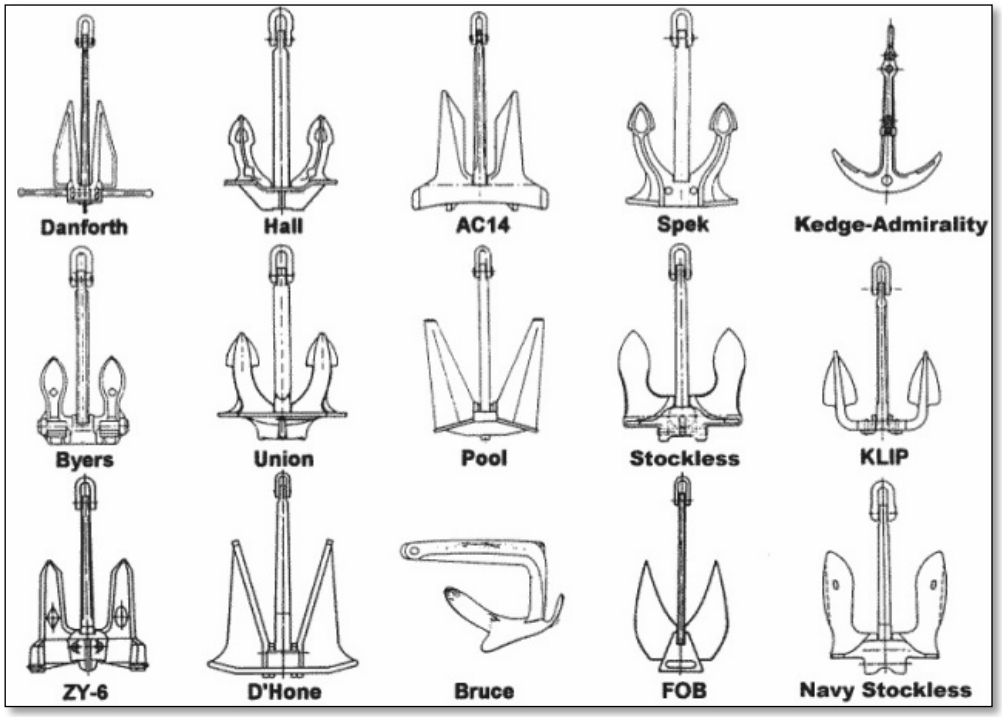

Figure 42: Types of stockless anchors (Image: Wikipedia 2019b)

Figure 43: Stockless anchor at bow (Image: AUS ROV 2019)

A stockless anchor (Figure 43), possibly of the M.A.F. Patent or Byers type (W. L. Byers and Co n.d. – see Figure 42, Figure 44), lies directly to the north of the this feature**.**

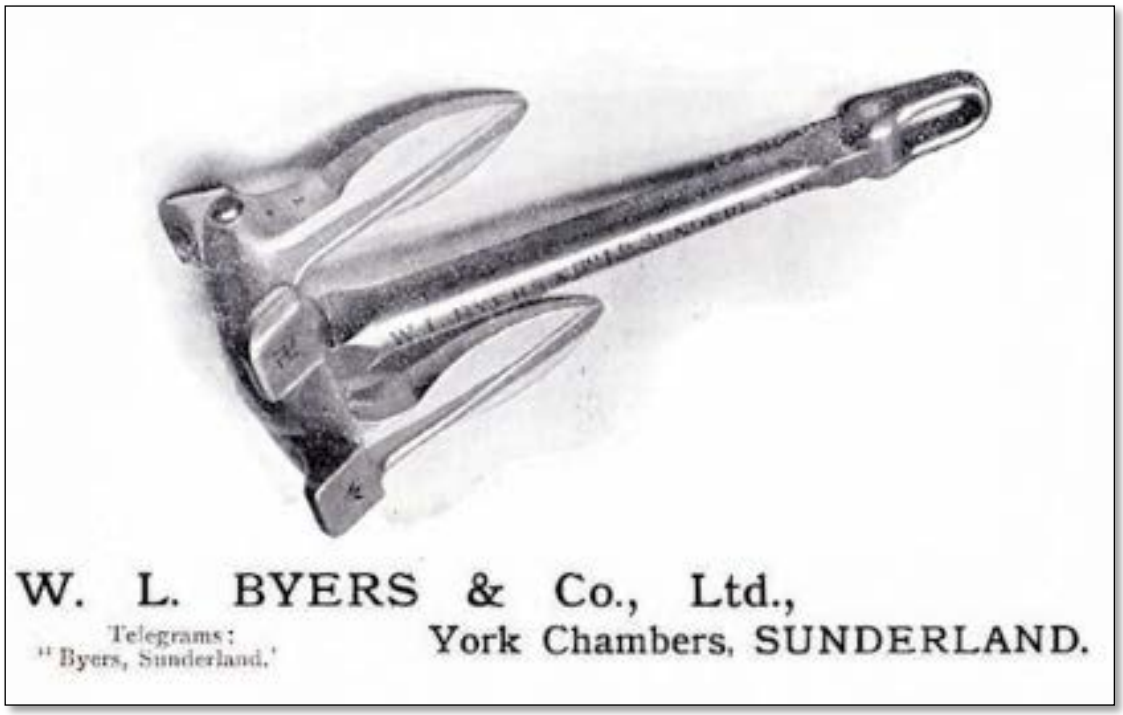

Figure 44: Byers Patent stockless anchor (Image: WL Byers n.d.: 17)

A set of bitts with rope still wound around the uprights is located on the port side periphery of the collapsed foredeck (Figure 45).

Figure 45: Bitts with rope attached from foredeck (Image: AUS ROV 2019)

The bow section behind the foredeck area has collapsed entirely, and is spayed out to port and starboard (Figure 46), which has either been caused by the bow hitting the seabed or by an explosion. The aligment of the foredeck features suggests that the foredeck has collapsed down and into the space beneath it. This is supported by the mast (probably from a derrick crane), which has collapsed and now lies across the bow extending onto the remains of the former bridge area. Figure 47 shows the typical historical configuration of a derrick mast onboard a coastal freighter from the first half of the twentieth century. The hounds or cheeks of this mast, which are normally situated in the upper sections of the lastare lying on the amidships area (Figure 48), suggesting that the mast was originally mounted on the bow and has fallen backwards towards the stern.

Figure 46: Bow section facing forward. Note the collapsed derrick crane post lying across the winch area, and the flattened section of hull aft (Image: AUS ROV 2019)

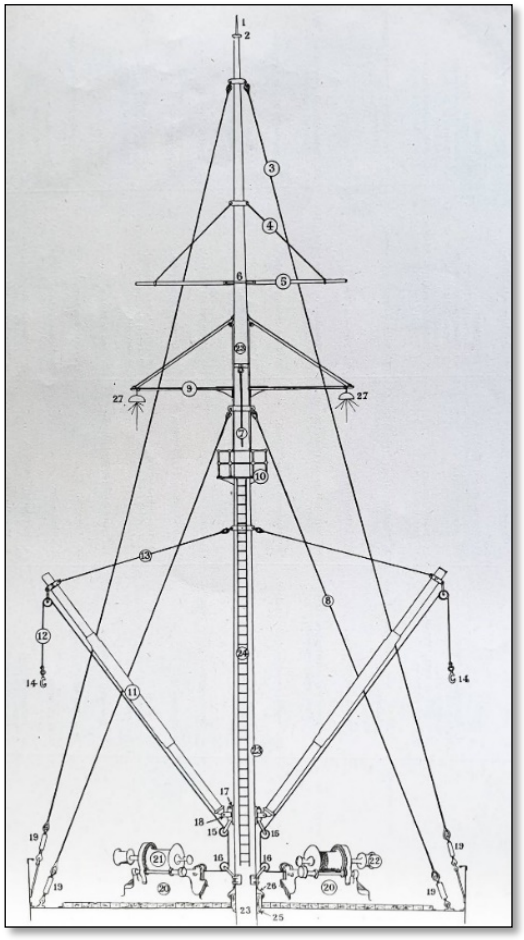

Figure 47: Typical mast and derrick crane structures used on coastal freighters (Image: Bataille and Brunet, 1937:62)

Amidships Area

Moving aft, the vessel evidences what can only be described as a catastrophic explosion at the probable location of the ships bridge. The structure is this area was completely destroyed, particularly at the forward end of the amidships structure which extends for at least 5-10m. Two levels of decking are just visible beneath piles of broken metal and debris (Figure 48). The lower decking appears to be on the same level as the intact section of bow, suggesting that this may be the main deck, and therefore the upper deck may be a promenade or bridge deck. On the port side, the remains of a strake with a porthole/ scuttle adhering are visible forward of the former bridge section outside of the vessel, with the remainder of the rubbing strake still intact on the side of the vessel aft of this point (Figure 49). The hull plating on this side has detached for most of the remaining amidships length, exposed the underlying frames (which are spaced approx. 1m apart).

Figure 48: Collapsed section of hull just aft of the bow, showing collapsed forward derrick crane post and cheeks (1), and section of the rubbing strake (2) on the port side, and detached strakes with porthole attached (3) (Image: AUS ROV 2019)

The hull side in the amidships port area has been broken off, and has collapsed back inside the vessel approx 1-2m above the intact rubbing strake, as evidenced by an alignment of portholes inside the hull which are either still attached to the hull plating or are disarticulated (Figure 50, Figure 51, Figure 52, Figure 53).

Figure 49: Area of substantial damage in area near former bridge structure. Note: the derrick crane mast cheeks (1), the remnants of the main deck under the mangled wreckage (2), and promenade deck (3) (Image: AUS ROV 2019)

Figure 50: Amidships section in vicinity of the former bridge showing detached rubbing strake (1) and detached hull plating (2) exposing underlying frames (3). Note porthole (4) lying on top of the collapsed hull just inside the vessel (Image: AUS ROV 2019)

Figure 51: Broken frames on the port amidships side (1), showing collapsed hull plating with intact portholes/scuttles resting inside the hull and deck beams (3) (Image: AUS ROV 2019)

Figure 52: Broken frames on the port amidships side (1), showing collapsed hull plating with intact portholes/ scuttles (2) resting inside the hull. Note what appears to be deck beams (3) in top left corner of image (Image: AUS ROV 2019)

Figure 53: Broken frames (1) on the port amidships side, showing collapsed hull plating with intact portholes/ scuttles (2) inside the hull. Note what may be the remains of the forward end of the boiler (3) just above the wobbegong shark (Image: AUS ROV 2019)

Moving further aft, the vessel demonstrates a repeat of the type of damage seen at the forward end of the amidships area. The intact section of hull tapers at a 45 degree angle (in the vertical plane) away again back to the seabed level (Figure 54, Figure 55). In this area, the remains of at least one large boiler is partially buried under collapsed hull and deck structure (Figure 53, Figure 56). The location of the feature against the port side suggests that the vessel may have been equipped with two boilers. This would appear to be typical of a twin boiler arrangement used in the early twentieth century (see Figure 57).

Figure 54: Aft end of amidships section of wreck, showing second area of explosion damage (Image: AUS ROV 2019)

Figure 55: Aft section of midships showing area of probable explosion damage (1) in the engine room area (Image: AUS ROV 2019)

Figure 56: Boilers (1) partially buried under collapsed hull and deck plating (Image: AUS ROV 2019)

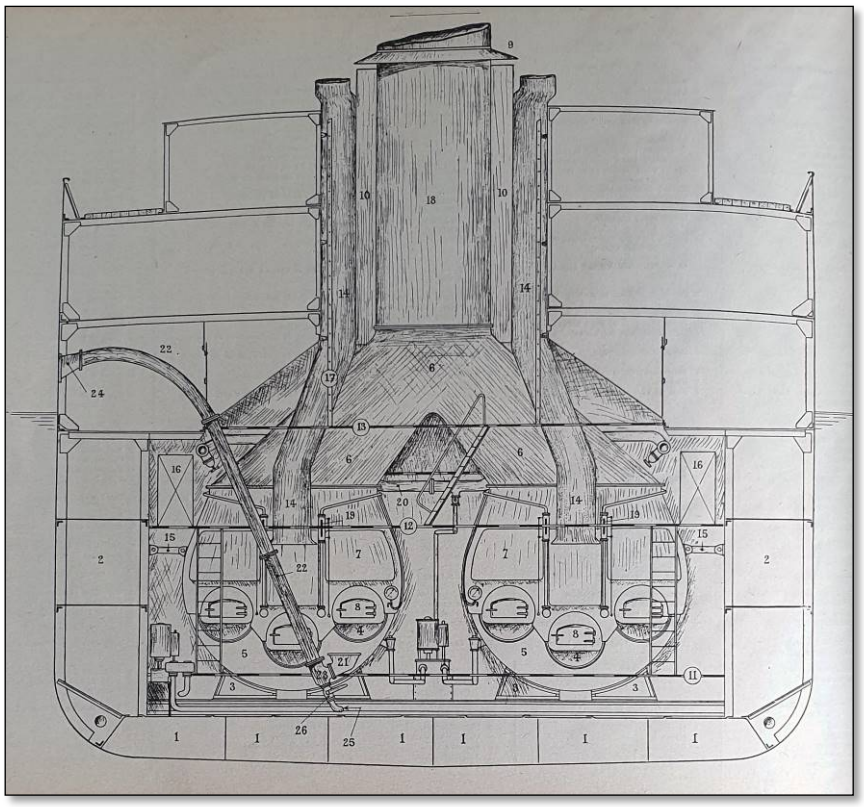

Figure 57: Typical twin boiler and ventilation configuration from coastal freighters in early twentieth century (Image: Bataille and Brunet, 1937:75)

Approximately 10m to the aft of the boiler is the remains of what appears to be a vertical triple expansion steam engine with as many as 3-4 cylinders buried under the steel debris (Figure 58). These engines operated with three stages, where high pressure steam was fed into the smallest cylinder to drive the piston, which then vented into a slightly larger cylinder at the end of that stroke, and then again vented into the largest (lowest pressure cylinder) where the process was repeated to maximise the use of the steam as its pressure reduced.

The top of what appears to be a low-pressure cylinder steam cover is lying canted over on a 45-degree angle (in the vertical plane). The rest of the engine (as indicated by possible tail rods) is located athwart (across) the wreck, and lies at a 45 degrees angle (in the horizontal plane) to the low-pressure cylinder (Figure 59). This suggests that the engine is broken in half, and its position indicates that it is now located perpendicular to its original mounting location. The demolished hull structure and damage to this engine suggest that there has been a second explosion in the ship, probably aft of the engine's location. Figure 60 shows an historical representation of a four-cylinder triple expansion engine.

Figure 58: View of collapsed aft section showing boiler (1), steam engine low pressure cylinder and tail rod (2), medium and high pressure cylinders (3) and lifeboat davits (4) (Image: AUS ROV 2019)

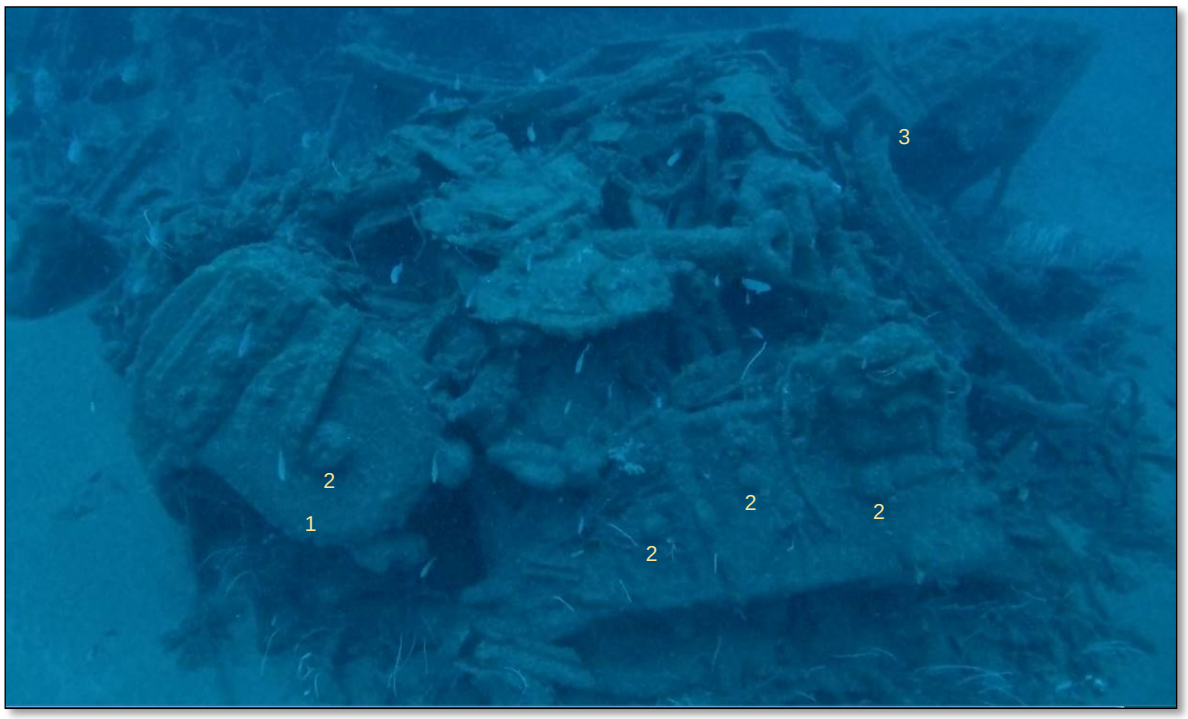

Figure 59: Closeup view of collapsed steam engine showing low pressure cylinder cover and tail rod (1) and tail rods (2) on main engine, which is perpendicular to its original position on head and broken section of the main engine. See also lifeboat davits (3) and engine pipes (Image: AUS ROV 2019)

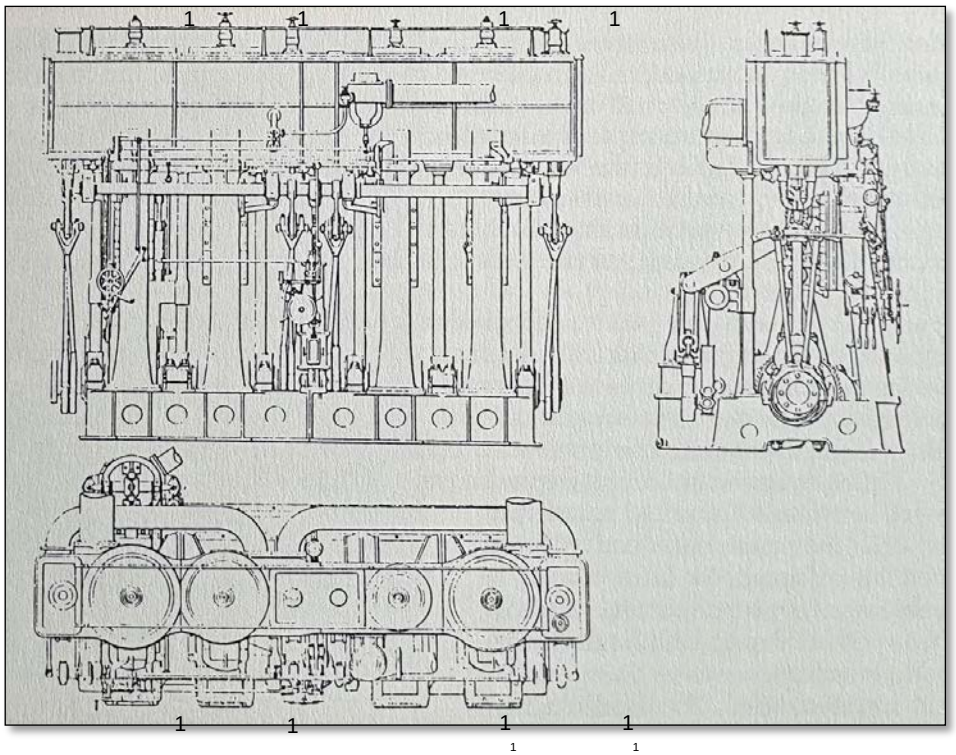

Figure 60: Four-cylinder triple expansion engine with tail rods (1) (Image: Seaton in Richards 1987)

There were several lifeboat davits located in the area between the boiler and the engine on the starboard side (Figure 61). The davits have the typical curved arms to support the falls for the lifeboat but have an unusual square sided pedestal base.

Figure 61: Lifeboat Davit (1). Note engine and steam pipe parts on bottom left of picture (Image: AUS-ROV 2019)

The starboard side of the wreck is also deteriorated along the blast area and the hull plating has collapsed outwards to the starboard of the engine and lifeboat davit area (Figure 62). A large box like structure with a protruding pole or pipe is located to the aft starboard of the engine (Figure 63). A pedestal like structure is located aft of this area on the starboard side, and may either be the base of a winch, capstan or mount (Figure 64).

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Figure 62: Starboard aft side of amidships section, showing extent of explosion to the vessel (Image: After AUS ROV 2019)

Figure 63: View of aft amidships section from starboard side, showing engine (1) and davits (2) area. Note the lack of any visible structure aft of this area, square structure with pipe extending from top and grey nurse shark in the foreground and crane mast/ derrick on left top (Image: After AUS ROV 2019)

Figure 64: Unidentified deck furniture (1) on starboard side of the vessel facing east, just outside the hull line and just aft of the engine/ explosion area, which could be a capstan, gun pivot mount or winch? (Image: After AUS ROV 2019)

A mast or derrick crane boom (Figure 65) runs from close to the base of the engine on the port side diagonally across the site towards the stern. It is tapered at the forward end and has what is probably rigging tackle (Figure 66, Figure 67) associated with a derrick crane boom at its root. Based on these observations it appears to have been mounted towards the stern. It lies across another section of crumpled hull plating, possibly from the upper hull, or alternatively from the driveshaft tunnel (Figure 68), as there is a pipe with a flange which may be part of the driveshaft for the propeller (Figure 69). Figure 70 shows a typical configuration of stern driveshaft in a coastal freighter from the 1930s. This feature is oriented perpendicular to the main wreck site, as is another section of crumpled hull plating (with portholes) and upright broken frames (Figure 71). These features suggest that the stern of the vessel may have partially detached as a result of the explosion, and may lie perpendicular to the longitudinal orientation of the main wreck site.

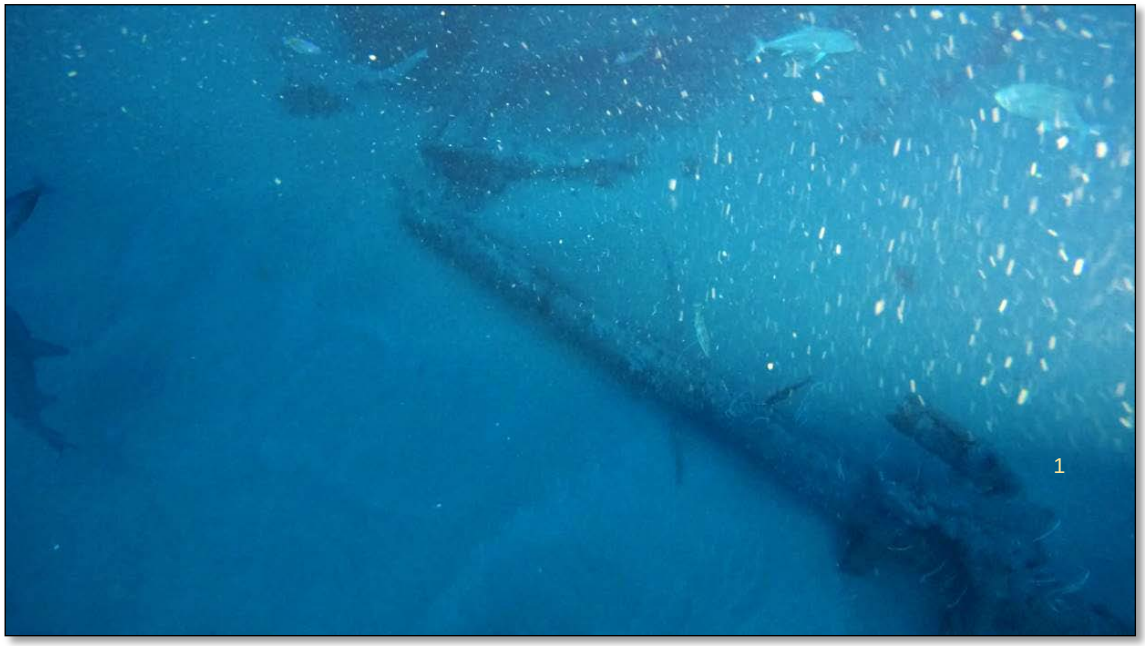


Figure 65: Derrick mast facing south. Note the rigging tackle of the lifting tackle/apparatus (1) still attached at the bottom right of the image (Image: After AUS ROV 2019)

Figure 66: Possible interior section of bent hull or shaft tunnel plating (1) and derrick crane mast (2) in aft section of wreck facing west (Image: After AUS ROV)

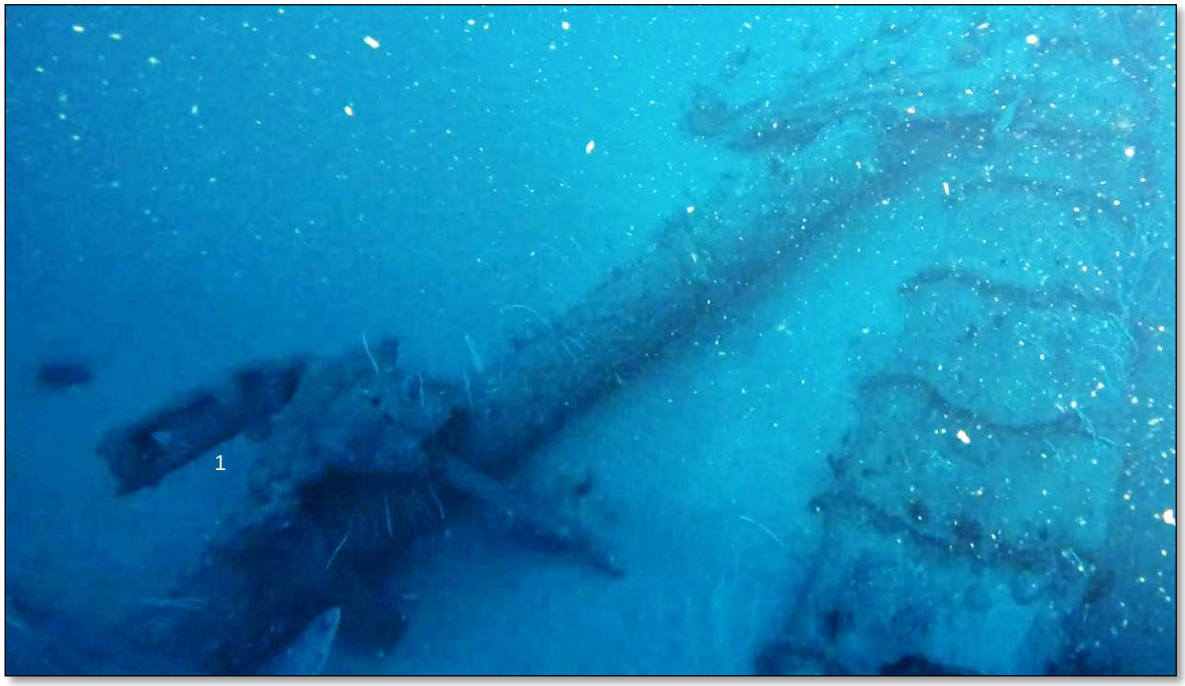


Figure 67: Closeup of possible derrick crane mast in aft section of wreck, showing rigging attachments for controlling the crane derrick (Image: After AUS ROV 2019)

Figure 68: Possible mast step of derrick crane, or hull plate and shaft tunnel section, with derrick crane behind (Image: After AUS ROV 2019)

Figure 69: Closeup of possible mast step of derrick crane mast; or stern propulsion drive shaft tunnel, drive shaft (1), stern-gland (2) and hull plating (3) (Image: After AUS ROV 2019)

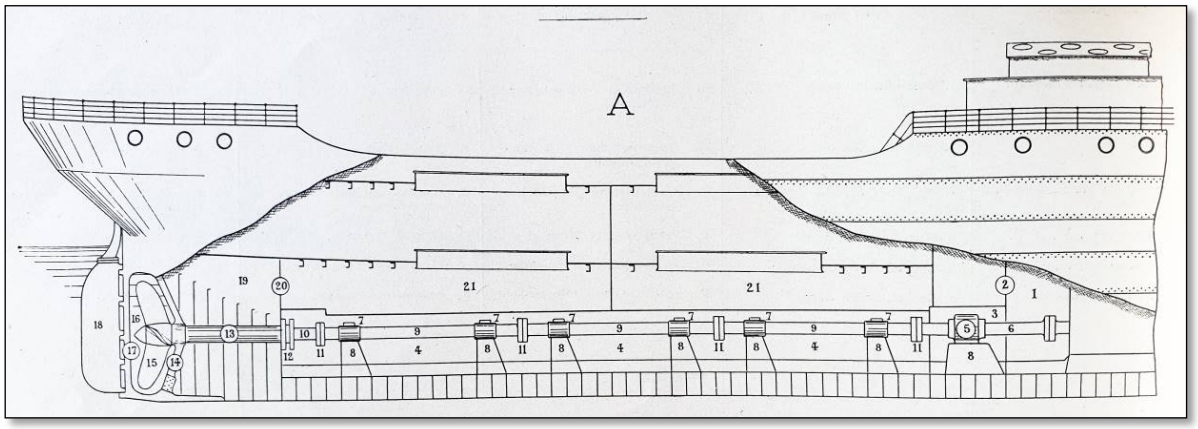


Figure 70: Typical stern propulsion drive shaft of early twentieth century coastal freighter, showing shaft tunnel (4), drive shaft (9), stern gland (12), propeller shaft (13) (Image: Bataille and Brunet, 1937:71)

Figure 71: Stern section view from west athwart the site. Note upright frames (1) running athwart the wreck orientation and the grey nurse shark (Image: After AUS ROV 2019)

Figure 72: Extreme northern end of wreckage facing south. Note the frames (1) running athwart the direction of the main wreck site and the porthole (2) behind the upright frames. In background is the possible drive shaft tunnel or bent hull plating (3); the derrick crane mast (4) and engine room debris (5) (Image: After AUS ROV 2019)

At the rear (or northern) end of the site is a section of upright frames and possible bent hull plating, with portholes/scuttles (Figure 72). This section of the hull runs athwart of the longitudinal orientation of the main site. Although this section is probably part of the stern section of the vessel, the presence of the portholes, frames and bent hull plating running in a direction contrary to the main site suggests that the stern section of the vessel may have

broken off during an explosion, and has been deposited at a 90 degree angle to the main wreck site after the vessel has settled on the seabed.

Figure 73 shows a sketch map of the shipwreck based on the ROV inspection videos. When compared to the 3D photogrammetric model generated by Daniel Adams of the HIVE Centre, Curtin University (Figure 74), which was provided as this report was being finalised, the detached nature and orientation of the stern section is even more pronounced than originally thought, lying approximately 120 degrees to its original location within the ship. Further works are planned with the HIVE Centre to compare and check the accuracy of the model with the multibeam sonar data, but this model further demonstrates the great utility of using photogrammetry to map and interpret these deep-water sites.

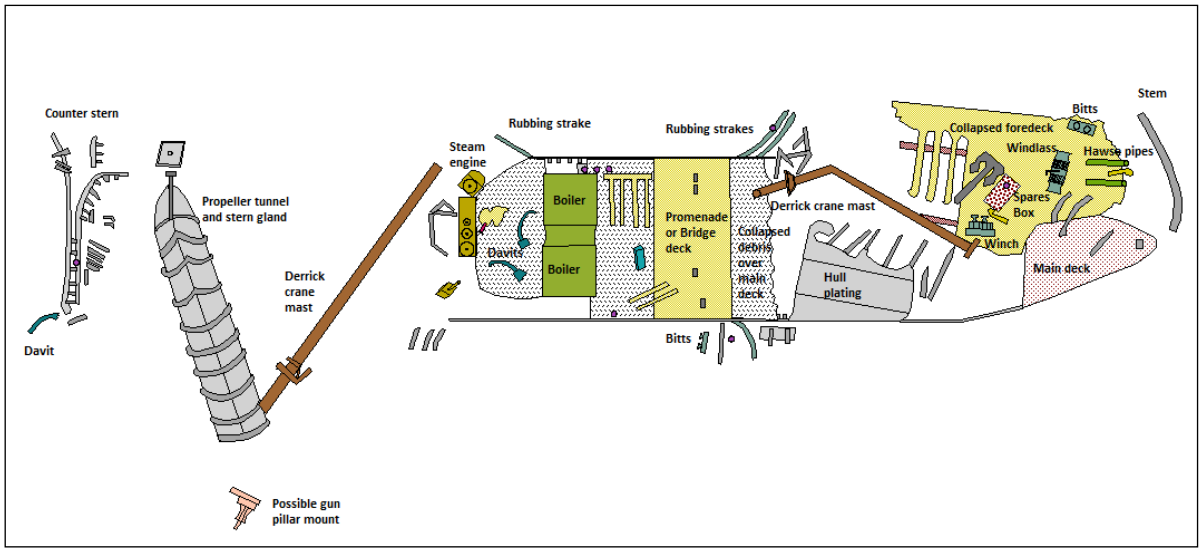


Figure 73: Sketch plan of *Wollongbar* (ll) based on ROV footage. Note portholes shown as purple circles scattered throughout the wreck (Image: Brad Duncan, Heritage NSW 2020).

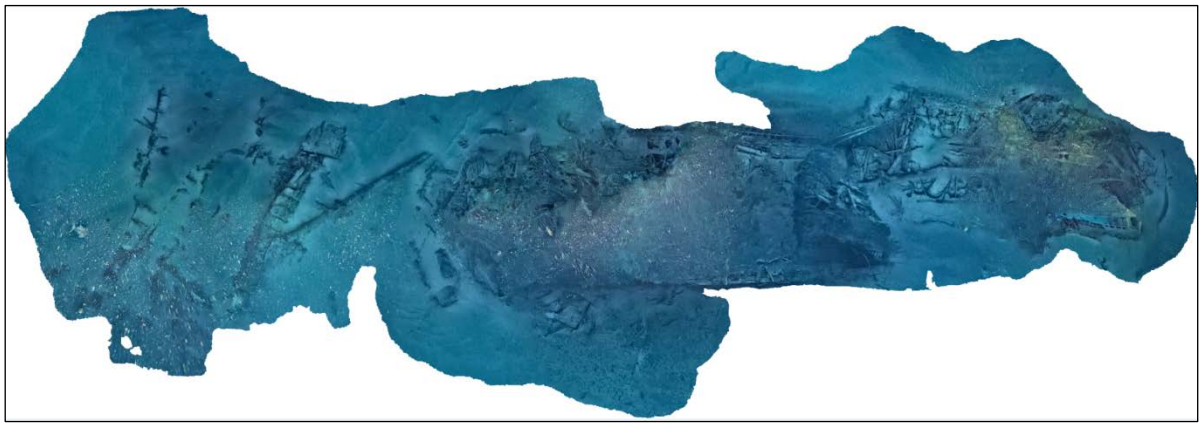


Figure 74: Birds eye view of the 3D photogrammetric model showing the layout of the site (Image: Daniel Adams, HIVE Centre, Curtin University, WA)

7. DISCUSSION/ INTERPRETATION

a. Identification of the Shipwreck

- **Location**

The previous historical location in the NSW Maritime Heritage Database is approximately 6.5km to the north west of this site. This initial location for the wreck was based on historical reported sinking location given by the Department of Navy. An updated location for the wreck was provided in the 1990's based on hearsay evidence that the wreck had been located by divers around that time. It is possible that the wartime secrecy and limitations in position fixing technology led to discrepancies that may account for the inaccuracy of this location, and the identification of the wreck that was claimed to have been found.

The only other vessel to have been lost in this general vicinity is the SS *Rosedale*, a 274 ton steamship whose dimensions were c. 43m long x 6.4m beam x 2.5m draft, which was lost in the vicinity of the Smokey Cape Lighthouse. That vessel is too short for the wreck that has been inspected at this location.

The initial dimensions obtained using multibeam sonar (83m long x 13.2 m wide) are consistent with the SS *Wollongbar* (II) (historically known measurements are: 86.89m long x 12.83m beam x 7.284 draft), which was sunk by a Japanese submarine in 1943.

- **Type of ship**

The wreck appears to be a coastal freighter of the pre- containerisation period (pre 1940s), when derrick cranes were used to unload cargos, as evidenced by the presence of two probable derrick crane masts and a steam winch typically used to operate them. The derrick cranes are located on the bow (Figure 46, Figure 48) and stern (Figure 65, Figure 66, and Figure 67) areas of the wreck, which is unusual, as most coastal freighters of the period had derricks mounted amidships close to the hold hatches. This suggest that the vessel carried passengers, and hence the cranes were mounted out of their way at the ship's extremities. This is consistent with the location of the *Wollongbar* (II)'s derrick mast mounting locations (Figure 75).

Figure 75: *Wollongbar* (II) under weigh showing location of derrick mast posts at bow and stern (Image: Ballina Naval and Maritime Museum Collection: Img # 190716121004-0001)

Figure 76: Bow of half model of *Wollongbar* (II) at Mid North Coast Maritime Museum (Image: B. Duncan Heritage NSW 2019)

The configuration of the foredeck furniture and the presence of the forward derrick crane on the foredeck is consistent with the SS *Wollongbar* (II) half model (Figure 76). The wreck has a plumb bow (Figure 32), with evidence of a collapsed foredeck with bitts used for mooring (Figure 45), a stockless style anchor - possibly of the Byers patent design (Figure 43), a possible steam winch (Figure 39) used to operate a derrick which was probably mounted on or close to the foredeck.

If the stockless anchor (Figure 43) is a Byers Patent, this is consistent with the period when the *Wollongbar* (II) was constructed, and conforms to the anchor on the half ship's model of the vessel located at the Mid North Coast Maritime Museum at Port Macquarie (Figure 79), and with the historic images of the vessel.

The misaligned / staggered rubbing strake evident on both sides of the amidships hull (Figure 48) matches the alignment on the half model and historical images (Figure 77), as does the evidence for a promenade and bridge deck on the wreck, as indicated by the row of collapsed portholes (scuttles) inside the interior of the midships section of the wreck.

The forward derrick mast on the wreck has collapsed aft across the steam winch. The configuration of the derrick cranes at the bow and stern extremities of the wreck is unusual compared with most other cargo vessels at this time (e.g. see Figure 78), which might suggest that the design was to keep passenger activity away from loading operation areas. This is consistent with the original design of the *Wollongbar* (II) as a passenger ship and coastal trader, and the configuration of the derrick masts within the found wreck also matches that vessel.

The fittings on the derrick cranes (Figure 65, Figure 66), along with the steam windlass (Figure 34) and derrick crane steam winch (Figure 39) found on the wreck are all consistent with those features shown on the half model of the *Wollongbar* (II) - (see Figure 80, Figure 81, and Figure 82) respectively.

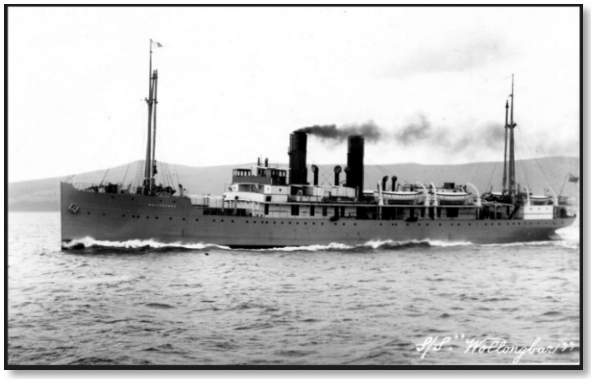


Figure 77: *Wollongbar* (II) showing configuration of bow and bridge area. Note similar style stockless anchor in hawsehole at bow (Image: Lithgows 1923)

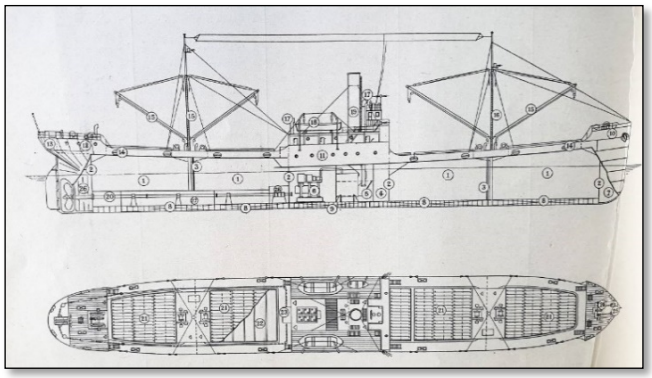


Figure 78: Plan of typical early twentieth century collier steamer (Image: Bataille and Brunet, 1937: 50)

The ship was steam powered, as evidenced by the boiler and steam engine. The engine appears to be an upright compound steam engine and the presence of up to four tail rods suggest that it was possibly a triple expansion engine.

The *Wollongbar* (II) was fitted with a four-cylinder triple expansion engine (Richards 1987: 62, 63). This type of engine is fitted with one cylinder for high and medium pressures and makes use of two similar larger sized cylinders for the final stage of the steam expansion.

The broken engine in this vessel appears to demonstrate four tail rods, suggesting that the engine is four-cylinder compound engine.

Figure 79: Anchor and plumb bow on *Wollongbar* (II) half ship model at Mid North Coast Maritime Museum (Image: © Brad Duncan Collection 2020)

Figure 80: Forward derrick crane on *Wollongbar* (II) half ship model at Mid North Coast Maritime Museum (Image: © Brad Duncan Collection 2020)

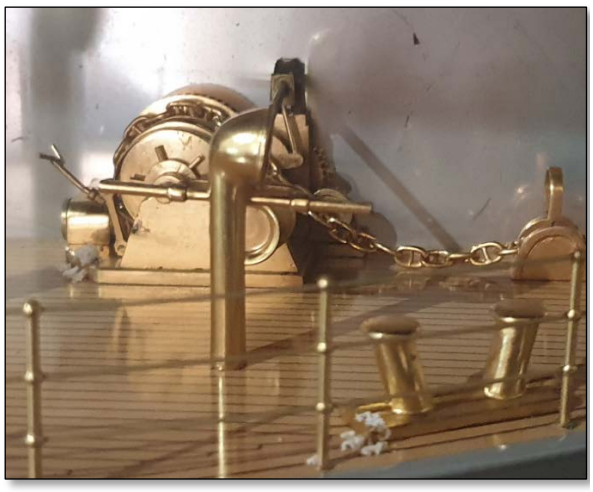


Figure 81: Steam windlass on *Wollongbar* (II) half ship model, Mid North Coast Maritime Museum Collection (Image: © Brad Duncan Collection 2020)

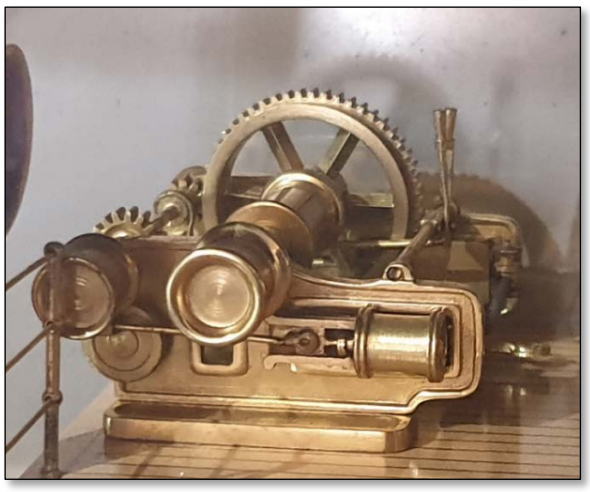


Figure 82: Steam winch on *Wollongbar* (II) half ship model, Mid North Coast Maritime Museum (Image: © Brad Duncan Collection 2020)

Two lifeboat davits visible at the stern/ engine section of the wreck (Figure 61) are identical in design to those on the *Wollongbar* (II) model (Figure 83). The lifeboats shown in the model are located close to the aft funnel, indicating that they were located behind the boiler, which is consistent with the location of the davits observed on the wreck.

Figure 83: Lifeboats davits on *Wollongbar* (II) model at Mid North Coast Museum (Image: Brad Duncan, Heritage NSW 2019)

Because the stern area appears to be disarticulated, it is difficult to make definitive statements about the stern construction. However, historic images of the stern when the *Wollongbar* (II) was on a slipway clearly show that the vessel did not have portholes/scuttles along the counter stern, but that these features were only present along the cabins below the main deck further forward (Figure 84, Figure 85). The wreck's main hull has portholes/ scuttles along its length on both sides of the hull. However, portholes/scuttles were seen on the northern most end of this site in the aft extremity (see Figure 72). As the *Wollongbar* (II) had no portholes on the counter stern section, this would further support the hypothesis that the stern has become detached from the main wreck and is currently located perpendicular to the longitudinal orientation of the main hull. This observation is consistent with the location of portholes/ scuttles seen in the historical images on the *Wollongbar* (II).

Figure 84: ***Wollongbar*** **(ll) on slipway showing portholes forward of counter stern area (Image: Lithgows 1922a)**

Figure 85: ***Wollongbar*** **(ll) on slipway from rear showing no portholes on counter stern hull (Image: Lithgows 1922b)**

Perhaps the most telling evidence on the wreck is the area of catastrophic explosions evident just aft of the engine and forward of the bridge. Although there is a possibility that the vessel suffered from a catastrophic boiler explosion, the extent of the aft damage on this wreck is much worse than would be expected in that scenario. It appears that the explosion occurred low in the vessel and has radiated upwards and on a 45-degree angle from the point of impact, as demonstrated by the jagged debris field at both ends of the former amidships island. This appears to be more consistent with a high explosive detonation probably around or below the waterline area, and with the explosive impact of a torpedo (Allan pers comms 2019).

Captain Damien Allan (RAN), an expert in naval ordnance and former Commander of the RAN Minehunter Fleet has speculated that the torpedo used by the I Class submarine was most likely an 893lb (405kg) Type 95 21 inch torpedo and would have been equipped with a Type 97 explosive. Allan stated that:

> *This was a big charge for such a lightly built ship* [as the *Wollongbar* (II)]. *Like the John Oxley* [a NSW merchant vessel of this period]*, the strength of these types of vessels was in the skin plating, and they only had token ribs* [frames] *of a light gauge which was used to hold the vessels together* (Allan pers comms 2019).

The US Naval Technical Mission to Japan 1945 (in Duncan and Smith 2016: 46) details that Type 97 Japanese explosive consisted of 60% TNT and 40% HDNA. The velocity of the explosion was 7100 m/s and the power of the explosion measured as specific brisance (i.e. the shattering capability of a high explosive, determined mainly by its detonation pressure) was 96 (relative).

Model	Diameter	Length OA	Total Weight	Explosive Charge	Range	Wander (max)	Comments
Type 95	21"	23' 5"	3671 lbs.	893 lbs.	9,000m @ 49 kts	170m / 9,000m	A smaller version of the Type 93 intended for
					12,000m @ 45 kts	250m / 12,000m	
Type 97	17.7"	18' 5"	2161 lbs.	772 lbs.	5,500m @ 44 kts	80m /5,500m	A miniaturized Type 93 intended for

Table 1: Specifications of Japanese Submarine Torpedo Types 95 and 97 (Source: Parshall and Tulley 2019)

The torpedoes carried on the Japanese Midget submarines during the attack on Sydney carried 780 lbs of Hexamite and Dynamite (Duncan and Smith 2017: 67). The M24 Japanese midget submarine used in the Sydney Harbour attack in 1942 carried a Type 97 torpedo which used a smaller charge (the Type 95 torpedo was over 1.16 times larger than the Type 97 which consisted of a charge of hexamite and dynamite - see Duncan and Smith 2016: 46, 67). Given that the explosion from the M24's torpedo was enough to blow the 55.65m Sydney ferry HMAS *Kuttabul* nearly 20ft (6m) out of the water when it was torpedoed during the Sydney Harbor attack in 1942, the devastating effect from the larger and more powerful Type 95 torpedoes of an *I* Class submarine can only be imagined.

In conclusion, from analysis of the ROV footage and the comparison with the Mid North Coast Maritime Museum Half Model, there is compelling evidence to suggest that the wreckage inspected off Crescent Head is indeed the wreck of the *Wollongbar* (II) (Figure 86 and Figure 87).

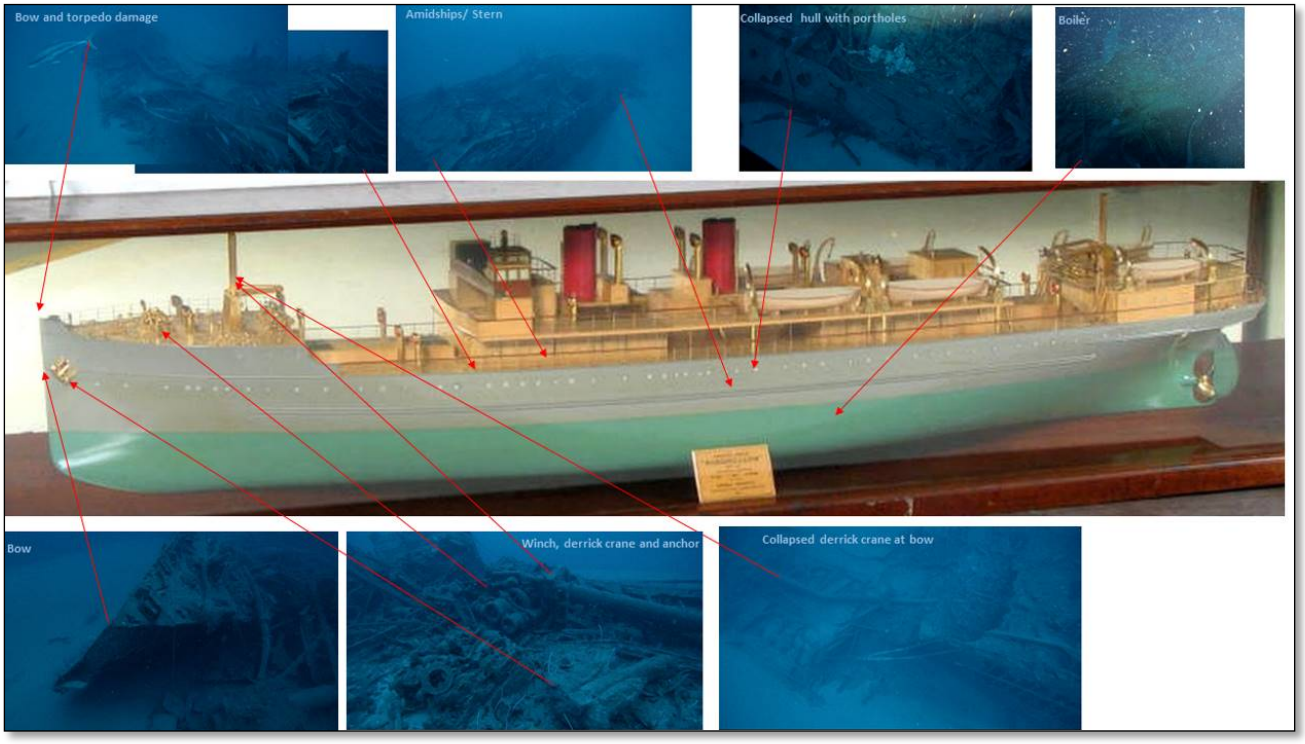


Figure 86: Corresponding features between the wreck site and the MAAS *Wollongbar* (II) half ship model on the port side (Image: Brad Duncan, Heritage NSW)

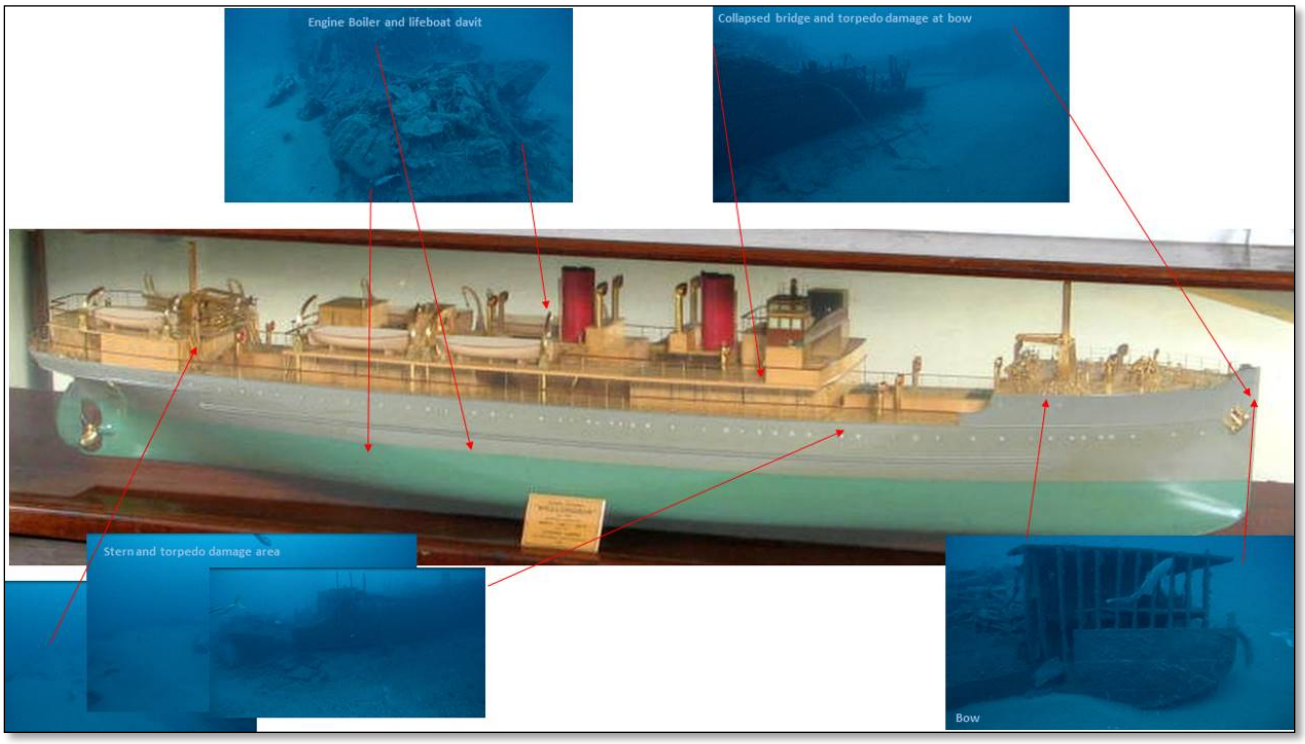


Figure 87: Corresponding features between the wreck site and the MAAS *Wollongbar* (II) half ship model on the starboard side (Image: Brad Duncan, Heritage NSW)

b. Cultural Site Formation Processes on the Wreck

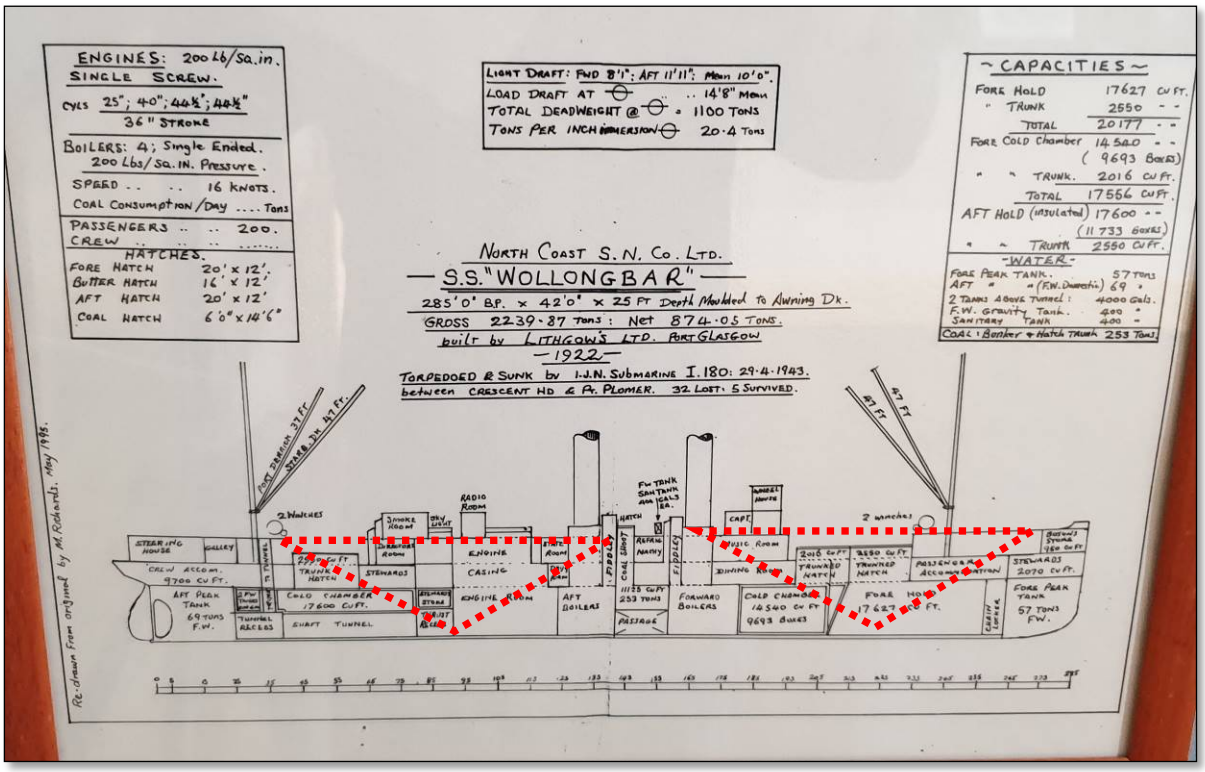


Figure 88: Vessel Plan of the *Wollongbar* (II) based on original held by Mike Richards at Mid North Coast Maritime Museum, showing the probable blast radius of the torpedo explosions in red (Image: Brad Duncan, Heritage NSW 2019)

- **Torpedo Damage**

The *Wollongbar* (II) was known to have been sunk by two torpedoes in 1943. It appears that the torpedoes have hit the vessel probably either on, or just in front of, the forward cold storage area in the forward hold compartment; and aft of the engine, most likely in the vicinity of the stern shaft tunnel area (Figure 88). This is consistent with Navy Office reports at the time that the *Wollongbar* (II) had been hit in the engine room and the Number 2 Hold (NAA 1943, #484841, p11, TOO 291025Z). These observations are supported by the blast radius back against the aft and forward sections of the amidships promenade and bridge deck structures, and by the rotation of the engine at right angles to its original longitudinal alignment.

It appears that the blast radiated out and upwards and has dislodged and/or weakened the entire bridge and promenade decks, and foredecks. From initial viewing of the ROV footage it appeared that deck areas had blown upwards and then fallen back into the interior, as evidenced by the line of collapsed and disarticulated portholes inside the hull in the amidships area. However, Captain Allan (pers comms 2019) has advocated that the force of the explosion actually weakened or broke the lightly constructed frames in these areas, causing the bridge, and promenade decks to collapse back inside the vessel's hull as the wreck corroded and the frames supporting them gave way over time.

Similarly, the foredeck has collapsed onto the port side of the bow and across the main deck in the bow section. The main deck has also collapsed almost entirely between the foredeck and the bridge area, further suggesting that this is the area that took the initial impact of the torpedo blast in the bow region.

The torpedo blast in the stern area appears to have partially disarticulated the stern aft of the engine room, and it appears that the stern section is now lying perpendicular to the longitudinal direction of the main wreck hull.

Both these observations are consistent with the survivor's accounts that the bow and stern of the vessel were separated and standing vertically as the vessel sank. It is therefore possible that the stern partially detached on the way down to the seabed, which might explain the current state and confused alignment of the wreckage in the stern section of the vessel.

The blast radius observed on the wreck is also consistent with the damage that was needed to dislodge the cargo of boxed butter, which was stored in one of the refrigerated areas (see Figure 88).

- **Fishing Activity Damage**

Local fishermen have recounted how components of the wreck including timber structural material has been raised from the wreck when they have become caught by rod fishermen on fishing hooks (there have been several reports by local mariners that this is a common occurrence on the site). This activity may be causing further damage to the site.

Cooper and Turner (2010:79) have suggested that the wreck had been found in the 1980s after fishermen caught their nets on it, which suggested that later net damage to the wreck may have occurred as a result. Interestingly however, the site showed no evidence of fishing nets anywhere, which suggest that local net fishermen have long known the location of the site and have avoided fishing in this area; that the site's location was not previously known at all to local net fishers; and/or that the wreck site referred to Cooper and Turner was not the *Wollongbar* (II).

c. Geomorphologic/ Hydrological and Natural Site Formation Processes

The site shows signs of sand accretion at the northern end, with erosion at, and beyond, the southern extremity, and along the western side and close to the upright amidships structure which has probably been produced by toe scouring effects. This is consistent with the direction of the Eastern Australian Current and demonstrates that the feature is acting as an underwater sand groyne. As a result, large amounts of sand are covering the stern section aft of the engine, obscuring visibility and making interpretation of this area difficult. Sand has also accreted around the amidships section on the port side, leading to sediment depletion scouring around the side of amidships section around the forward section of port side and along the entire starboard side. Similarly, sand accretion in the area between the former collapsed bridge and upright bow section had led to toe scouring on the starboard side of the intact bow section. It appears that the direction of the current runs slightly angled from north to south orientation by about ten degrees running to the west of the wreck (see Figure 89).

It is likely that the high velocity of the Eastern Australian Current has further added to the gradual collapse of the vessel, which was already considerably weakened by the twin torpedo blasts. The presence of this strong current has probably also significantly increased corrosion processes across the site, due to the highly oxygenated water passing constantly across the wreckage. It is also probable that the current has carried loose components of the wreck away from the site, suggesting that there may be a scattered debris field further to the south of the site, the components of which may now be buried. Further exploration in this direction with a towed at depth sidescan sonar or magnetometer may reveal previously undiscovered components of the wreck.

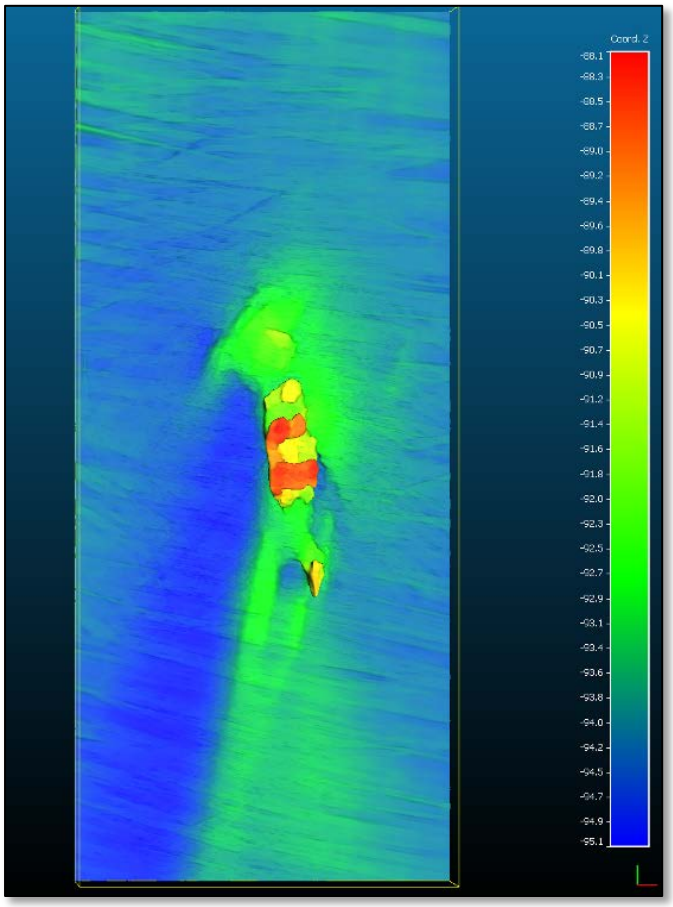


Figure 89: Multibeam image of *Wollongbar* (II) site showing sand accretion and scouring across the wreck (Image: AUS-ROV 2019)

8. SIGNIFICANCE

The process of finding out whether an item is important is called assessing significance. In Australia, the different levels of government have established Criteria for assessing significance. These are examined further below. The nationally recognised Australia ICOMOS Charter for the Conservation of Places of Significance (The Burra Charter) also defines 'cultural significance' as meaning: 'aesthetic, historic, scientific and social value for past, present and future generations.' Significance is thus an expression of the cultural value afforded a place, site or item.

There are multiple heritage criteria that may be applied to this wreck to assess its values. These are heritage significance criteria applied under:

- Commonwealth *Underwater Heritage Act 2018 Act Rules*;
- NSW State Heritage Register; and;
- National Heritage List.

Although the heritage significance criteria are applied differently and can operate at different levels or thresholds, the criteria for each usually align to those in the other sets and cover the same points related to significance. This report has not undertaken a detailed heritage significance investigation but provides preliminary assessment and suggestions about which values within the criteria the wreck/ site might be considered to meet. Even though the wreck lies outside of NSW jurisdiction, it is likely that if the wreck was located inside State waters then it may have been considered eligible for State Heritage Register listing, and hence NSW State level criteria have also been included.

a. Heritage Criteria – *Underwater Cultural Heritage Act 2018*

The Commonwealth Department of Agriculture, Water and Environment has established eight (8) criteria for assessing the heritage significance of a shipwreck. The criteria are:

- Criterion (a) - the significance of the article in the course, evolution or pattern of history;
- Criterion (b) - the significance of the article in relation to its potential to yield information contributing to an understanding of history, technological accomplishments or social developments;
- Criterion (c) - the significance of the article in its potential to yield information about the composition and history of cultural remains and associated natural phenomena through examination of physical, chemical or biological processes;
- Criterion (d) - the significance of the article in representing or contributing to technical or creative accomplishments during a particular period;
- Criterion (e) - the significance of the article through its association with a community in contemporary Australia for social, cultural or spiritual reasons;
- Criterion (f) - the significance of the article for its potential to contribute to public education;
- Criterion (g) - the significance of the article in possessing rare, endangered or uncommon aspects of history;
- Criterion (h) - the significance of the article in demonstrating the characteristics of a class of cultural articles.

b. Heritage Criteria - State

The Heritage Council of New South Wales has established seven (7) criteria for assessing the heritage significance of an item or place. The criteria are:

- Criterion (a) – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);
- Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);
- Criterion (c) – an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);
- Criterion (d) – an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;
- Criterion (e) – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);
- Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);
- Criterion (g) – an item is important in demonstrating the principal characteristics of a class of NSW's
    - cultural or natural places; or
    - cultural or natural environments (or a class of the local area's cultural or natural places); or
    - cultural or natural environments.

c. Heritage Criteria – National

The Australian Heritage Council (Commonwealth) has established National Heritage criteria against which the heritage values of a place are assessed. These are:

- a. the place has outstanding heritage value to the nation because of the place's importance in the course, or pattern, of Australia's natural or cultural history
- b. the place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history
- c. the place has outstanding heritage value to the nation because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history
- d. the place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of:

    I. a class of Australia's natural or cultural places; or

    II. a class of Australia's natural or cultural environments;
- e. the place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group
- f. the place has outstanding heritage value to the nation because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period

- g. the place has outstanding heritage value to the nation because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- h. the place has outstanding heritage value to the nation because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history
- i. the place has outstanding heritage value to the nation because of the place's importance as part of Indigenous tradition.

The cultural aspect of a criterion means the Indigenous cultural aspect, the non-Indigenous cultural aspect, or both.

To reach the threshold for the National Heritage List, a place must have 'outstanding' heritage value to the nation. This means that it must be important to the Australian community as a whole.

d. Significance of the Wreck of the SS *Wollongbar* (II)

The following initial indicative assessments of the significance of the wreck are provided against the key categories and values expressed in the abovementioned heritage criteria.

Historic
The wreck is protected by its age as an historic shipwreck. All shipwrecks and their associated artefacts that have been underwater for 75 years or more are protected by the *Underwater Cultural Heritage Act 2018* (Commonwealth) and in State waters by the NSW *Heritage Act, 1977* (the wreck at the time of inspection was 76 years old).

Associative/Historic Associations

The wreck of the SS *Wollongbar* (II) is associated with one of the major conflicts of the Twentieth Century, World War II (WWII). The sinking of the *Wollongbar* (II) resulted from an attack by a Japanese submarine whilst the vessel was underway on 29 April 1943. This occurred in the period when the Japanese attacked mainland Australia with aircraft and coastal shipping with submarines. From 1942-1943, Australia faced a national emergency with a perceived threat to the civilian population. *Wollongbar* (II) is a wreck with a significant loss of life in WWII.

Aesthetic/Technical

The physical remains of the wreck have technical significance as they display some of the key features and attributes of steamships built by the major shipyards of the Clyde (Port Glasgow) in this period. The fieldwork was able to identify numerous items and features still evident on the wreck such as the steam engine, boiler, steam windlass, steam winch, stockless anchor, and other elements. The wreck also displays clear physical evidence of the attack and the consequent catastrophic impacts on the vessel which directly resulted in its sinking and current state as a wreck site.

Social

The wreck has high social significance to local and state communities as it is widely considered by them to be a ‘war grave’ site for the victims who died during the incident, although it is not officially recognised as such (Note: the term *War Grave* specifically refers to graves in designated War Grave Cemeteries that have been established by the Commonwealth War Graves Commission). It is a site of tragic loss of life and remains a memorial to that event and its impact on the local community, the State, and the families of

those who perished in the sinking. This is especially evident by the dedication of a specific room within the Mid North Coast Maritime Museum (Port Macquarie) where the victims of the tragedy and the bravery of the rescuers are commemorated (Figure 90).

Figure 90: Commemorative Honour Roll Board at *Wollongbar* (II) Room, Mid North Coast Maritime Museum, Port Macquarie (Image: Brad Duncan, Heritage NSW 2019).

Research Potential

The *Wollongbar* (II) site has considerable research potential for cultural and natural aspects.

Cultural

Future work would be likely to reveal further features and technical details related to the vessel and its loss, and the dynamics of the incident that resulted in its sinking. Further work would also be likely to yield additional information about the environmental conditions of the site, and the influence of the vigorous marine environment and natural processes on the formation and decay of the wreck over time.

Natural

The site is home to a previously unknown and unexpected population of the critically endangered Grey Nurse shark species. Future work and research may establish that the *Wollongbar* (II) wreck is an important key aggregation site for these sharks and such areas, where sharks may be found consistently throughout the year, are regarded as habitat critical to the survival of the species. *Wollongbar* (II) may be one of few key aggregation sites found in Commonwealth waters off the NSW coastline. In this regard the site is highly likely to be of particular interest to marine scientists and marine environment managers.

Rarity

Wollongbar (II) is one of a small group of wreck sites directly associated with attacks on coastal shipping in WWII that demonstrates the catastrophic consequences for local

communities and families of the war arriving on Australian shores. In this regard the wreck site is rare.

Representativeness

Together with other wreck sites found for vessels sunk as the result of Japanese submarine attacks (such as the *Limerick*) the *Wollongbar* (II) wreck is representative of the vessels equipped as a Defensively Equipped Merchant Ship (DEMS) maintaining vital supply lines during the war time period, and demonstrating the strategic importance of coastal shipping. As a group, these wrecks also represent the consequence of concerted enemy action against Australia and NSW in WWII, and warrant consideration as a cultural landscape nomination in regard to WWII Japanese activity along the Eastern Australian Seaboard.

Public Education

The site presents significant opportunities for public education, through the interpretation of the site using photogrammetry and 3D modelling, but also for the edification of research techniques used to investigate deep water maritime wreck sites. Further educational opportunities may be presented through the study of marine fauna at the site, and the role of shipwrecks as fish aggregation sites. Most importantly, the wreck can further educate the public about the role played by merchant craft in WWII and the meaning of the site as a pseudo memorial and “war grave” to the community.

Further work may allow for additional significance assessment of the *Wollongbar* (II) wreck site in the future.

9. MANAGEMENT ISSUES

a. Legislative Protection

The Unidentified Wreck at Crescent Head (now identified after this fieldwork as the *Wollongbar* (II)) is automatically protected as a Historic Shipwreck under the Commonwealth *Underwater Cultural Heritage Act 2018.* Any disturbance of the wreck site can only be undertaken in accordance with the conditions of a valid Permit issued by the NSW Commonwealth Shipwreck Delegate (Executive Director, Heritage NSW) or the Commonwealth Minister of Department of Environment and Energy.

b. Site Management

Many local people consulted during the fieldwork, including those with a potential financial interest in the wreck (e.g. some fishermen and fishing charter operators who operate from Port Macquarie) indicated that they would like a Historic Shipwreck Protected Zone to be declared around the site as they felt it was disrespectful to be fishing on it.

That is a matter for the Commonwealth Department of Agriculture, Water and the Environment (Heritage Branch). It can be instigated by public nomination.

The site also contains a large population of resident Grey Nurse sharks, which are currently on the critically endangered list and form part of the sessile material of the wreck site. Given that at least two dozen of these sharks were seen on the video inspection of the site, the site is likely to be of particular interest to marine scientists and marine park managers/ legislators. Otway (2019) and Gidding-Reeve (pers comms 2020) have both indicated that the site is highly significant as a potential grey nurse shark aggregation area, one of only a handful of sites along the NSW coast.

As such, the wreck has the potential for nomination as a Commonwealth Marine Park to protect the possible resident population of sharks. There is precedent for this as another reef area (known as Cod Grounds – Parks Australia Division: 59) which is located to the north of this location and has been declared to preserve the resident population of grey nurse sharks.

10. RECOMMENDATIONS

a. Further fieldwork

A side-scan survey of the site (with the fish being towed at depth) would probably reveal a better overall impression and details of the site, including other smaller, materials around the wreck that would not have been detected by the Multi-beam unit. Given that large sections of the vessel may be spread across the seabed (and under it) as a result of the twin explosions, a magnetometer survey would be likely to achieve good results in identifying these items.

The very strong currents associated with the Eastern Australian Current have serious implications on the ability to undertake a successful ROV inspection of the site. The ROV contractors (AUS-ROV) raised concerns that about operating an ROV in this environment and suggested that a ROV would struggle to undertake an adequate survey in this area., This was readily apparent when the ROV device was deployed and nearly 50 kg of weights were added to the umbilical line just to get the ROV down to the seabed

The contractors successfully employed a “driveby” inspection at speed which was the only option given the extremely strong currents, whereby the boat was navigated up-current of the wreck, and then when the ROV was close to the seabed, the boat speed was reduced so that it began to drift backwards at a slower speed than the prevailing current. This method required considerable skill on behalf of the ROV Operators and the support vessel’s Captain. No fishing nets were encountered onsite as originally anticipated, but the presence of commercial fishermen at the site restricted operational manoeuvrability. These issues would need to be considered for any further work that is planned onsite.

Additional inspections of the site using a larger ROV equipment or Automated Underwater Vehicles (AUV) are likely to provide better opportunities to record the wreck photogrammetrically, with the aim of producing a more detailed 3 D model of the site. Any venture of this kind should also investigate any associated debris field around the main site and should consider using professional/academic photogrammetric processing experts (such the Curtin University HIVE Centre team) in the inspection project design. A drop camera is unlikely to yield adequate results given the very strong currents onsite.

Possible collaborative sources of ROV and AUV equipment such as the RAN, CSIRO vessel Investigator, Defence Maritime Services (DMS) and the Defence Science Technology Group (DSTG), along with academic, private and commercial ventures should be explored.

Further diver inspection at close range would improve the documentation of the site. The extreme depth of this site precludes all but technical diver visitation. Therefore, examination of the site by technical divers might be undertaken, whereby divers could submit their photographic and video footage of the site. This should be coordinated as a collaborative project with divers. This might facilitate plotting of relics onsite, along with more detailed investigation of specific features onsite such as the stern section and engine room areas.

It is recommended that all these avenues be further explored.

b. Other Recommendations

The following recommendations are made, that:

1. The wreck and its new location is recorded as a Historic Shipwreck on the NSW Maritime Heritage Online Database and the Commonwealth Australian National Underwater Cultural Heritage Database;
2. A media release was issued to coincide with ANZAC Day 25 April 2020. It contained details of the discovery and efforts by Heritage NSW to investigate and identify the wreck. This resulted in the at least 28 different representatives of relatives of deceased officers and crewmen from the wreck contacting Heritage NSW
    i. Many relatives reiterated that they felt:
        a. the wreck site was a *War Grave* and should be respected. One relative's comments summed up the sentiment of most of the relatives:

            My Father isn't comfortable with fishing at the site... There are plenty of other places to fish in the sea. I also have strong feelings about not diving there. You cant just walk through a graveyard and pick up pieces from there. Its not right. There are bodies still there – buried amongst the wreck and sand. It's not a fun park, its a grave site!! (David Durie pers comms 22 May 2020).
        b. closure at finally knowing the location of the wreck where their loved ones were resting, and that they finally had a location to grieve and lay wreaths;
        c. relief knowing that those below decks would almost certainly have been killed outright or quickly and had not likely died by drowning in the vessel;
        d. better knowing that the wreck site was now a place swarming with marine life:

            *My Father (Herb Mills) was a naturalist would have loved the fact that the vessel is teeming with life…Dad would be absolutely thrilled to know about the grey nurse sharks. He loved the sanctity of all life…that's the environment, that's their home… (*Penny van der Berg pers comms 8 May 2020)
3. A copy of this report was sent to the Commonwealth Department of Agriculture Water and Environment, by the NSW Historic Shipwrecks Delegate in July 2020..
4. The Code of Conduct for Diving with Grey Nurse Sharks be considered for adoption for any divers accessing the site (see Anonymous 2014; Department of Environment 2014; Department of Primary Industries 2014);
5. Any reports from divers of skeletal remains discovered on the site should be reported directly to NSW Police and the Coroner.
6. The wreck could also be considered as Commonwealth Marine Park due to the presence of the critically endangered Grey Nurse Shark population which is residing at the site;
7. Further work to recognise the wreck as an unofficial grave site for the victims of the event be instituted. This could include:
    i. the organisation of a memorial event over the site to lay wreaths. Any commemoration event should also strongly consider using the original rescue boat *XLCR* in some capacity inside the Port Macquarie area (Note: the vessel is not certified to leave Port Macquarie and operate outside the Heads);
    ii. Alternatively (or additionally), a commemoration ceremony could be held at the Hyde Park War Memorial in Sydney, or the Australian Merchant Navy memorial in Canberra (or both);
8. Interested potential stakeholders should be advised of the discovery of the wreck. These include but are not limited to:
    i. Victims'/ relatives;
    ii. Rescuers'/ relatives;
    iii. Port Macquarie Historical and Community Groups;
    iv. Maritime Union of Australia;
    v. RAN DEMS association;
    vi. Department of Veterans Affairs;
    vii. North Coast Steam Navigation Company (or parent agency).

9. Further work should be undertaken to document the stories and familial connections to the wreck, with a view to:
    i. incorporating these stories into any further significance assessments;
    ii. establishing a website on the history and significance of the wreck site
    iii. producing a booklet or paper on this aspect of the wreck which might be released in time for any future site commemoration ceremonies.
10. Further fieldwork should be undertaken using a magnetometer and sidescan sonar to more accurately ascertain the condition and extent of the site;
11. A more detailed significance assessment be undertaken for the wreck site, along with possible consideration for nomination of the site onto the National Heritage Register (Commonwealth). Any consideration for National listing would need to consider the importance of this vessel as opposed to other vessels that were also sunk by submarine attacks around the country and/or lost in WWII;
12. A comprehensive conservation management strategy for the wreck be developed in conjunction with the Commonwealth Department of Agriculture, Water and the Environment;
13. That marine research agencies such as (but not limited to) be notified of the existence of the grey nurse population:
    i. the Sydney Institute of Marine Science:
    ii. Commonwealth Parks Australia Division;
    iii. Australian Institute of Marine Science,
    iv. Solitary Island Marine Park;
    v. the NSW Marine Estate Management Authority (NEMA) project;
    vi. the Australian Fisheries Management Authority (AFMA);
    vii. The NSW Dept. of Primary Industries;
14. Consideration should be given to establishing a memorial/interpretation somewhere in the Crescent Head and/or Port Macquarie vicinity. Possible funding sources for this venture might include:
    i. Department of Veteran Affairs;
    ii. Maritime Union of Australia
15. A copy of this report be sent to:
    i. All stakeholders involved in the inspection, interpretation and reporting of the site;
    ii. All community groups and individuals related to either the vessel's officers and crew, or rescuers;
    iii. The Australian Hydrographic Office
    iv. Commonwealth Department of Agriculture, Water and the Environment;
    v. Department of Veteran's Affairs
    vi. Royal Australian Navy and Seapower Centre; and
    vii. Relevant threatened species managers and marine scientists.
16. The Australian Hydrographic Office should be advised of the discovery of the wreck as a potential hazard to navigation.
17. This report should be uploaded to the Heritage NSW website to be publicly available.

11. CONCLUSION

This report has shown that the unidentified wreck off Crescent Head is actually the wreck of the coastal Steamship SS *Wollongbar* (II) which was sunk by a Japanese submarine torpedo attack in 1943. As such, the shipwreck is automatically protected under the Commonwealth *Underwater Cultural Heritage Act 2018* as an historic shipwreck as it is over 75 years old.

Therefore, the records for this site will be amended to indicate that the shipwreck has been found, and to update details of its location and discovery as an historic shipwreck on both the NSW Maritime Heritage Online Database, and the Commonwealth Australasian Underwater Cultural Heritage Database.

Initial assessment of significance for the wreck of the SS *Wollongbar* (II) has found it to have likely significance under the Commonwealth *Underwater Cultural Heritage Act 2018* Rules heritage criteria for historic, associative, technical, social, research, rarity and representative values.

The wreck of the SS *Wollongbar* (II) is associated with World War II (WWII) and occurred as the result of enemy action in torpedoing the vessel in April 1943. *Wollongbar* (II) is a wreck with a significant loss of life in WWII giving it strong social significance to the local community and to relatives of the victims, rescuers and others involved with the incident. The remains of the wreck display clear physical evidence of the torpedo attack on the vessel.

The wreck site also has natural values as it is likely to be an important aggregation site for a population of the critically endangered Grey Nurse shark as sessile components of the site.

BIBLIOGRAPHY

Adamson, Todd, 2020, Telephone Conversations between Todd Adamson, (ex) RMS Boating Officer, South West Rocks, NSW, and Brad Duncan, January – June 2020.

Allan, Damien, (Captain), 2019, pers comms. Telephone Conversation between Captain Damien Allan (RAN), Director Navy Heritage Collections, Garden Island and Brad Duncan, 5 December 2019 re: Japanese Torpedo charges and ordnance.

Anonymous, 2014, Code of Conduct for Diving with Grey Nurse Sharks. In: Grey Nurse Shark (Carcharias taurus) Legislative Protection, Environment Protection and Biodiversity Conservation Act 1999. http://www.environment.gov.au/marine/marine-species/sharks/greynurse . Available at In: Appendix B - Recovery Plan for the Grey Nurse Shark (*Carcharias Taurus*), Australia Draft Grey Nurse Shark Recovery Plan. http://www.environment.gov.au/resource/recovery-plan-grey-nurse-shark-carcharias-ta . Accessed 5 May 2020.

ANZAC Portal 2019, The Sinking of the Wollongbar II, *Anzac Portal* Website, Department of Veteran Affairs, https://anzacportal.dva.gov.au/stories-service/australians-war-stories/sinking-wollongbar-ii . Accessed 20 December 2020.

Balmain History n.d., Storey & Keers c.1912, Balmain History Flikr webpage: https://www.flickr.com/photos/69965207@N03/6387890561 , Accessed 18 November 2019.

Bataille, Louis, and Brunet, Marcel, 1937, *From Keel to Truck: Dictionary of Naval Terms Based Upon Original Dictionary by Captain Paasch; 5th Edition Revised and Enlarged with Additions by Bataille, Louis and Brunet, Marcel*. London: George Phillip and Son Limited.

Caledonian Maritime Research Trust 2019, *Wollongbar*, *Scottish Built Ships, The History of Shipbuilding in Scotland* website: http://www.clydeships.co.uk/view.php?year_built=&builder=&ref=10799&vessel=W, Accessed 18 July 2019.

Cooper, Ray, and Turner, Lynda, 2010, *The Sinking of the Wollongbar II*, Wauchope: Wauchope District Historical Society.

Daily Examiner, 22 November 1945, S.S. *Wollongbar* Sunk by Torpedoes, Grafton: *Daily Examiner* Newspaper, page 2

Department of Environment 2014, *Recovery Plan for the Grey Nurse Shark (Carcharias taurus)*, Canberra: Department of Environment, Commonwealth of Australia. Available at: http://www.environment.gov.au/resource/recovery-plan-grey-nurse-shark-carcharias-ta. Accessed 5 May 2020.

Department of Primary Industries 2014, *Protecting the Greynurse Shark…a guide for recreational fishers and divers*, Nelson Bay, NSW: Department of Primary Industries. Available at: https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/635092/GNS-Protection-Guide.pdf . Accessed 30 May 2020.

Duncan, Brad 2010, *Non-submarine echoes around Australia* (based on research provided by Peter Taylor), Unpublished private GIS layer.

Duncan, Brad, and Smith, Tim, 2016, *An Assessment of Potential Unexploded Ordnance (UXO) Aboard the M24 Japanese Midget Submarine (1942),* NSW Heritage Division, Office of Environment and Heritage: Parramatta, NSW.

Local Notes 2012, *Old Balmain, Paddocks and Shipyards*, http://localnotes.net.au/?p=2435, Accessed 18 November 2019.

Marcus, Alex, 1986, *"DEMS, Whats DEMS?": The story of the men of the Royal Australian Navy who manned defensively equipped merchant ships during World War II*, Brisbane: Boorlarong Publications.

McKinnon, Brett, pers comms 2020, Telephone Conversations with Brett McKinnon, Professional Fisherman, Port Macquarie and Brad Duncan, January – June 2020.

MHO #243, *Wollongbar* (II), *Maritime Heritage Online* (MHO) *Database* website, https://www.environment.nsw.gov.au/maritimeheritageapp/ViewSiteDetail.aspx?siteid=243 . Heritage NSW, Department of Premier and Cabinet. Accessed 21 Oct 2019.

MHO #247, *Wollongbar* (I), *Maritime Heritage Online* (MHO) *Database* website, https://www.environment.nsw.gov.au/maritimeheritageapp/ViewSiteDetail.aspx?siteid=247 . Heritage NSW, Department of Premier and Cabinet. Accessed 21 August 2019.

MHO #990, *Limerick*, *Maritime Heritage Online* (MHO) *Database* website, *https://www.environment.nsw.gov.au/maritimeheritageapp/ViewSiteDetail.aspx?siteid=990* Heritage NSW, Department of Premier and Cabinet. Accessed 21 August 2019.

When referencing National Archives of Australia files in the text of this document, the following convention has been used: (NAA / Barcode # of file / Page # in file / Correspondence Reference # on Page).

NAA 1941, # 5947772, *Request approval and Finance Authority for DEMS [Defensively Equipped Merchant Ship] COOLANA, NGATORO, WOLLONGBAR - rigging paravane equipment,* National Archives of Australia Collection # NAA: MP150/1, 674/201/751, Barcode # 5931142.

NAA 1941, # 5947774, *Request approval and Finance Authority for DEMS [Defensively Equipped Merchant Ship] PULGANBAR, WYANGARIE, WOLLONGBAR, GORJISTON - paravane equipment modifications and fitting*, National Archives of Australia Collection # NAA: MP150/1, 674/201/753, Barcode # 5947774.

NAA 1941, # 5952208, *Commonwealth ship WOLLONGBAR - Running trials of paravanes*, National Archives of Australia Collection # NAA: MP150/1, 674/206/575, Barcode # 5952208.

NAA 1942, # 5931056, *Request approval and Finance Authorities for repairs to equipment for CORINDA, MALAITA, PERSEUS and WOLLONGBAR*, National Archives of Australia Collection # NAA: MP150/1, 674/201/1101, Barcode # 5931056.

NAA 1942, # 5931142, *DEMS [Defensively Equipped Merchant Ship] CYCLE, WOLLONGBAR, WYANGERIE and ZAANLAND - repairs to paravane equipment*, NAA: National Archives of Australia Collection # MP150/1, 674/201/1239, Barcode # 5931142.

NAA 1942, # 5940002, *WOLLONGBAR – deperming*, National Archives of Australia Collection # NAA: MP150/1, 674/206/1091, Barcode # 5940002.

NAA 1942, # 5941087, *DEMS [Defensively Equipped Merchant Ship] WOLLONGBAR defensive equipment*; National Archives of Australia Collection # NAA: MP150/1, 674/206/1458, Barcode # 5941087.

NAA 1943, # 484841, *Sinking of SS Wollongbar*, National Archives of Australia Collection # NAA: MP1049/5, 2026/10/1508, Barcode # 484841.

NARA #4697018, 30 Apr 1943, War Diary Commander Seventh Fleet: 29 April 1943, Admiralty War Diaries 4/1/43 – 4/30/43, Reel A2161, Micro Serial Number K-7-D, p 464 - 465, World War II Diaries 1941-1945: Other Operational Records and Histories, from Record Group 38: Records of the Office of the Chief of Naval Operations, 1875 - 2006, World War II War Diaries, Other Operational Records and Histories, ca. 1/1/1942 - ca. 6/1/1946, National Archives and Records Administration collection record # 4697018, Available at: https://catalog.archives.gov/id/77762048 . Page located at: https://s3.amazonaws.com/NARAprodstorage/lz/microfilm-publications/WWII_WarDiaries/0001/A_2161/A_2161/images/0465.jpg. Research provided from Peter Dunn Research Collection, Australia at War Website https://www.ozatwar.com/wwiiresearchproducts.htm .

NSW Heritage Branch 1995, *Shipwreck Atlas of New South Wales* (2nd Edition), Sydney: NSW Heritage Branch, Department of Urban Affairs and Planning.

NSW Heritage Office 1992, *Atlas of New South Wales Wreck Sites*, Sydney: NSW Heritage Branch, Department of Planning.

Otway, N., Ellis, M., Louden, B., Gilligan, J. and K. Smith, 2019, *Hooking Induced Disease, Cachexia and Reproductive Cessation in grey Nurse Sharks off Eastern Australia,* Presentation for Department of Primary Industry Fisheries.

Paasch, Heindrich, 1901, *Vom Kiel zum Flaggenknopf: Illustrirtes Marine-Worterbuch in Englisch, Franzosisch und Deutsch,* Hamburg: Eckardt and Messtorff, Steinhoft, Reprint 1978.

Parks Australia Division, 2018, *Australian Marine Parks: Final Assessment Regulation Impact Statement (Second Pass) – Management for 44 Australian marine Parks*, Canberra: Parks Australia Division, Commonwealth Department of Environment and Energy https://ris.pmc.gov.au/sites/default/files/posts/2018/03/management_plans_for_44_australian_marine_parks_ris.pdf . Accessed 16 November 2019.

Parshall, Jon, and Tulley, Tony, 2014, *Japanese Torpedoes. In Imperial Japanese Navy Page,* Combined Fleet Webpage: http://www.combinedfleet.com/torps.htm . Accessed 5 December 2019.

Pursey, H.J. 1948, *Merchant ship construction: Especially written for the Merchant Navy*, Glasgow: Brown, Son and Ferguson Ltd, Nautical publishers. Available at:

Radley, Cec, pers comms 2019, Interview with Cecil Radley, ex Professional Fisherman, at Port Macquarie on 26 September 2019 by Brad Duncan.

Radley, Shirley, pers comms 2019, Interview Shirley Radley at Port Macquarie on 26 September 2019 by Brad Duncan.

Richards, Mike, 1987, Workshorses in Australian Waters: A History of Marine Engineering in Australia; Wahroonga, NSW: Institute of Marine Engineers.

Seaton, A. E. 1921, *A Manual of Marine Engineering*, https://ia802701.us.archive.org/32/items/marineen00seatmanualofrich/marineen00seatmanualofrich.pdf **, Accessed 4 July 2019.**

Shelton, Geoff, pers comms 2020, Telephone Conversations between Geoff Shelton, Fishing Charter Boat Operator and Fisherman, Port Macquarie, and Brad Duncan, January – June 2020.

Smith, Tim, 2007, *Wreck of the Japanese Type 'A' Midget Submarine M24 Preliminary Archaeological Survey Report, Bungan Head, Newport, Sydney*, Australia, Heritage Branch, NSW Department of Planning, Underwater Cultural Heritage Program. Available at: http://www.environment.nsw.gov.au/resources/heritagebranch/m24/m24prelimsurvey.pdf

Smith, Tim 2012, *World War Two Shipwrecks and Submarine Attacks in NSW Waters1940-1944,* Information Sheet - Heritage Branch 2009, Updated 2012.

Taylor Peter, 2013, *Shipwrecks: A practical guide to research and discovery*. Newport, Victoria: Scuttlebutt Press.

US Naval Technical Mission to Japan, 1945, *Japanese Explosives: "Intelligence Targets Japan" (DNI) of 4 Sept. 1945, Fascicle O-1, Target O-25*, , US Naval Technical Missions to Japan, Microfiche Reels JM-200, NOAA Collection. Available at: http://www.fischertropsch.org/primary_documents/gvt_reports/USNAVY/USNTMJ%20Reports/USNTMJ-200E-0465-0531%20Report%200-23.pdf. Accessed 29 Mar 2016.

W. L. Byers and Co. Limited, n.d. *Ships and their anchors, W. L. Byers and Co. Limited, Manufacturers of Byers Stockless Anchor*, Sunderland: York Chambers. http://www.searlecanada.org/sunderland/images13/byersbooklet.html#03, Accessed 20 September 2019.

Wikipedia, 2019a, Paravanes (Weaponary). *Wikipedia* website: https://en.wikipedia.org/wiki/Paravane_(weapon) , Accessed 17 November 2019.

Wikipedia October 2019b, *Anchor*, *Wikipedia* Website, https://en.wikipedia.org/wiki/Anchor, Accessed 15 October 2019.

Images:

AUS-ROV 2019, Unpublished inspection and data of *Wollongbar* (II) shipwreck undertaken by remote sensing contractors AUS ROV on July and September 2019 under contract on behalf of Heritage NSW. Images extracted from video and enhanced by Brad Duncan, Heritage NSW.

AWM Collection n.d.: *Aerial port side view of the Australian cargo vessel Wollongbar which was sunk off Port Macquarie, NSW, on 1943-04-29 by a Japanese submarine. (Naval Historical Collection),* Australian War Memorial Collection # 304149, https://www.awm.gov.au/collection/C251290, Accessed 3 July 2019.

Ballina Naval and Maritime Museum Collection, n.d., *Wollongbar* (II) *steaming*. Ballina Naval and Maritime Museum, Ballina, NSW Img #190716121004-0001.

Green, Allan, 1940, *Wollongbar*, Allan C. Green Collection, State Library of Victoria Colelction website: http://search.slv.vic.gov.au/permalink/f/1cl35st/SLV_VOYAGER1646500 , Accessed 18 July 2019.

Lithgows 1922a, *Wollongbar* (II) on slipway from Rear Port, *Lithgows of Port Glasgow, Shipbuilders Collection*, https://pudzeoch.smugmug.com/Ships/Lithgows-of-Port-Glasgow/i-LS2Tnzf. Accessed 16 July 2019

Lithgows 1922b, *Wollongbar* (II) on slipway from Rear, *Lithgows of Port Glasgow, Shipbuilders Collection*, https://pudzeoch.smugmug.com/Ships/Lithgows-of-Port-Glasgow/i-dzcMB6N. Accessed 16 July 2019

Lithgows, 1923, *SS Wollongbar* (II) departing Glasgow, *Lithgows of Port Glasgow, Shipbuilders Collection*, https://pudzeoch.smugmug.com/Ships/Lithgows-of-Port-Glasgow/i-LJtVFh9 . Accessed 16 July 2019.

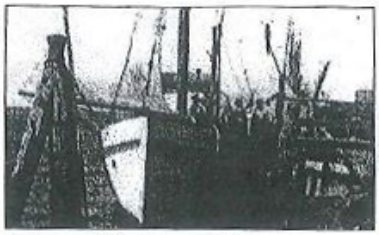
Museum of Applied Arts and Science Collection H5323, *"Wollongbar" half ship model. Made 1922, Gift of North Coast Steam Navigation Co, 1954* (Photographer unknown), Museum of Applied Arts and Science website: https://collection.maas.museum/object/242961 **.** Accessed 20 July 2019.

Slevin Collection 1922, *Wollongbar* (II) approaching a dock, Maritime Museum of Tasmania Collection # P_Sle_10_21A. https://images.ehive.com/accounts/3906/objects/images/kk436l_bimt_l.jpg. Accessed 16 July 2019.

State Library NSW Collection 1924, *Wollongbar Fleet visit April 1924*: State Library of NSW Collection

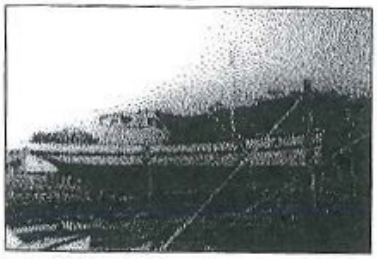
APPENDIX ONE: 2012 History of *XLCR* Information Sheet (Bruce Jordon n.d., Mid North Coast Maritime Museum)

XLCR INFORMATION SHEET

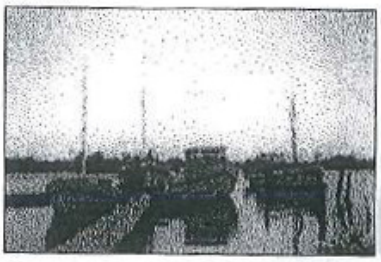


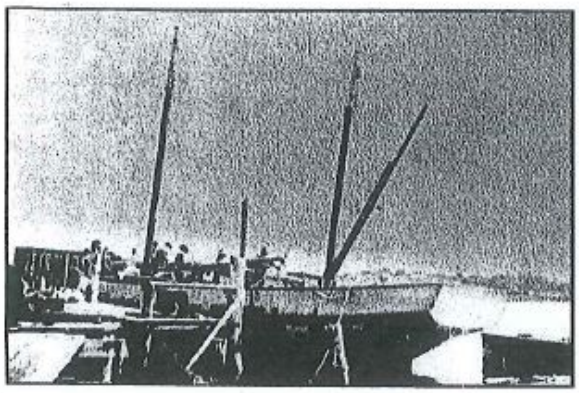
A BRIEF HISTORY BY BRUCE JORDAN

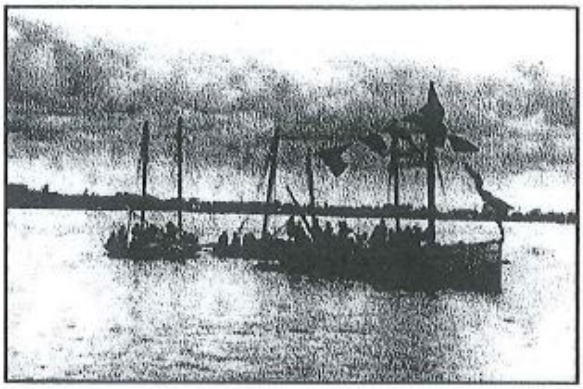
Circa 1900	Built at Iluka on the Clarence River
Builder	Gus Green
Owner	Bill Paddon for use from the Tweed River
1903-17	Capt Bill Paddon introduced longlining and Jewfish netting from XLCR Fished from Tweed river in the north to Moruya in the south Had two masts - ketched rigged with gaff rigged sails Rescued , Fishing Smack Nina Meg at Yamba river entrance.
1927	Purchased by Tom Radley and Francis Cochet and moved to Port Macquarie , Pioneered fish trapping , which is still used today , in the Port Macquarie area.
1930	Safety boat for 18' Skiff Regattas , pre war - Port Macquarie regatta ground
1943	29th April , Skipper Claude Radley and crew took XLCR to sea knowing that a Japanese submarine was still in the area after sinking Wollongbar 11 off Crescent Head with the loss of 32 lives XLCR picked up the 5 survivors and landed them safely at Port Macquarie. XLCR was the rescue boat for the Hastings River for several years in the 1950's
1962	XLCR was sold by the Radley family and taken to Lakes Entrance area for scallop fishing , used commercially in southern waters until mid 80's
1989	Purchased by Gordon Stokes and Garry Treloar of Portland Harbour Victoria Moored in Portland Harbour for past eight years .
1997	Bruce Jordan arranged purchase and delivering of XLCR to Port Macquarie with generous support of prominent Port Macquarie businessmen David Morton and Jeff Gillespie, the XLCR to eventually be a community owned vessel under the care of the City of Port Macquarie Chamber of Commerce.
May 97	Safely back home on Port Macquarie waters awaiting restoration to ensure XLCR will be capable of surviving the next one hundred years as a focal point of the proposed Lady Nelson Wharf at the Town Green .
June 97	Application has been made for a grant under the Heritage 2001 program to conserve and present the XLCR , at the proposed Lady Nelson Wharf in the Town Green Redevelopment , as Port Macquarie's most historic surviving vessel.
Aug 97	XLCR slipped at Port Marina Slipway, two day working bee to stabilize underwater area, found to be in sound condition.
Oct 97	Hastings Heritage trust established, to manage XLCR project.



Note: For further information and displays on the sinking of the Wollongbar 11 visit the Mid North Coast Maritime Museum , William St Port Macquarie Ph 83 1866 : :Phone Bruce Jordan on 831005 if you have any information on the XLCR.



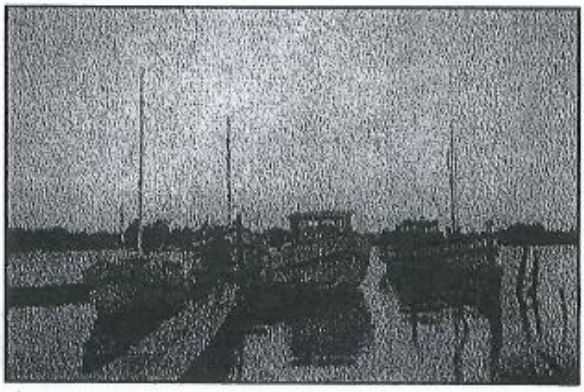




XLCR

1901-1920
Sail - Fishing Offshore

1920-1940
Offshore Fishing and Safety Boat



1943
Wollongbar 11 Rescue

1950-1962
Fishing

TOWARDS 2001

Safely home in Port Macquarie May 1997

Proposed Lady Nelson Wharf Site
Incorporating XLCR Wharf.

APPENDIX TWO: MARITIME HERITAGE DATABASE -

Wollongbar II

History | Database | Links | Print

History

The new wave of Japanese submarine attacks in 1943 continued with devastating effects when *I-180* sank the *Wollongbar* off Crescent Head. Thirty-two lives were lost including Captain Benson, with the five survivors rescued by lifeboat.

The 2,240-ton steel steamer was built in 1922 to replace the North Coast Steam Navigation Company's earlier vessel of that name wrecked at Byron Bay in 1921. The new 87-metre steamer was built at Glasgow, United Kingdom.

The loss of the *Wollongbar*, coincided with a fresh spate of submarine attacks in early 1943 which claimed: *Kalingo* 17.1.1943; *Iron Knight* 8.2.1943; *Starr King* 9.2.1943; *Recina* 11.4.1943; *Limerick* 26.4.1943; *Lycia M. Childs* 27.4.1943; *Fingal* 5.5.1943 and *Portmar* 16.6.1943.

Database

Site information

Site ID:	243		
Type:	Steamer screw	Construction:	Steel
Primary Industry:	Transport	Sub-Industry:	
Gross tonnage:	2239	Net tonnage:	874
Length (mtrs):	86.89	Beam (mtrs):	12.83
Draft (mtrs):	7.284	Cargo:	
Engine:	Triple expansion		
Country built:	UNITED KINGDOM	State built:	
Port built:	Glasgow	builder:	Lithgows Ltd
Port registered:	Sydney	When built:	1922
Registration number:	25/1922	Official number:	150190
Sources:	SMH 8/5/1943 RANZ 1941 RBS		
Comments:	Sunk by torpedo fired from Japanese submarine I-180.		

Lost event

When lost:	1943/04/29	Where lost:	Port Macquarie, Crescent Head
Wrecked/Refloated:	Torpedoed	Sinking:	Sunk by enemy action
From port:		To port:	
Master:	C Benson	Owner:	North Coast Steam Navigation Company
Crew:		Passengers:	
Crew deaths:	0	Passenger deaths:	0
Total deaths:	32		

Location

Maximum latitude:		Minimum latitude:	
Maximum longitude:		Minimum longitude:	
Datum used:			

Datum	Latitude	Longitude	Zone	Easting	Northing
AGD66					
AGD84					
GDA94					
WGS84					

Management

Found:	Yes	Inspected:	NO
Protected:	Historic Shipwrecks Act 1976	Jurisdiction:	Federal
Protection notes:			
Signage:		Web address:	

Links

Figure 91: Maritime Heritage Online Database listing for *Wollongbar* (II)

APPENDIX THREE: HERITAGE INFORMATION SHEET: *WOLLONGBAR* (II)

Wollongbar (II) (1922-1943)

Shipwreck information Sheet

The *Wollongbar* (II) was a single screw steamship owned by the North Coast Steam Navigation Company Ltd. At 2239 tons and 87 metres in length, the vessel had been built at Lithgow's Ltd shipyard at Port Glasgow, Scotland in 1922. *Wollongbar* (II) was built to replace an earlier steamer of the same name wrecked at Belongil Beach, Byron Bay in 1921.

***Lithgows of the Port of Glasgow website collection*.**

Wreck event

On the 29th April 1943 the merchant ship *Wollongbar* (II) was torpedoed and sunk by the Japanese submarine *I-180* off Crescent Head New South Wales on a voyage from Byron Bay to Newcastle. Out of a crew of 37 only five survived. Onboard was a cargo of 18,000 cases of butter, sugar and bacon.

Just the day before, the vessel was searching for survivors of the freighter *Limerick* torpedoed and sunk off Ballina on 26 April. This loss was attributed to *I-177*. Submarines were about!

Captain Toshio Kusaka boldly surfaced *I-180* only 450 metres from *Wollongbar* (II) at 10.15am on 29 April 1943. Captain Charles Benson (59) and the Chief Officer Will Mason saw the conning tower submerging into a bubbling sea and a torpedo, already fired, bouncing erratically at them at speed. There was no time even to sound the emergency alarm. Captain Benson bawled '*look out for yourselves, boys'*, then went down the port ladder. The lookout man also left the bridge as Able Seaman Roy Brown remained at the wheel. Mason later recounted how the "*torpedo struck us just forward of the bridge with a terrific thud*" near Number 2 hold. Within moments another torpedo slammed into the port side which "*suddenly exploded with a thunderous crash*".

Survivors told how the ship broke in two, with the bow and stern rising sharply into the air. *Wollongbar* (II) sank within two minutes, taking Mason deep under water until he "*shot up like a jack-in-the-box*". He first clung to a box of butter, then a life ring, transferring to a damaged lifeboat from the ship. Engine room greaser Frank Emson was draped across its bows, having been badly scalded by a steam pipe with skin hanging off his arms and hands.

Life ring from wreck of Wollongbar* (II) *at Mid-North Coast Maritime Museum (Image: B. Duncan, Heritage NSW)

Two sailors, Roy Brown (who had been at the ship's wheel) and Pat Tehan rowed to them. Both men were uninjured, and they placed Emson on the raft and towed it behind the boat. The four men inspected a few other empty rafts and then saw another with fireman Blinkhorn waving a piece of white wood. Mason described how, "*When we picked him up his clothes were still dry. He told us that he was thrown by the explosion out of a bunker and landed on* (the) *raft … quite happy and unhurt*".

A Catalina flying boat was miraculously passing above them and saw the terrific tower of water from the explosions; even seeing the submarine at periscope depth before it descended into deep water. Being unarmed, it could only provide moral support, flying around the 'circle of devastation' and seeing the five men scrambling onto the rafts and boats. Captain Benson had rigged the ship's boats and rafts so that if the vessel sank, they would float free. The aircraft left the scene and dropped a message onto the town wharf about the disaster.

The five survivors stayed for about an hour amongst the wreckage and thousands of cases of butter looking for others, dead or alive, but found no one. The men began to row towards the coast and when about two miles off at about 4pm, were collected by the Radley family's local fishing trawler, *XLCR* (Excelsior), sent to their aid.

The XLCR at Port Macquarie (Image B Duncan)

One survivor remarked that "*I knew the XLCR would come to rescue us*", as they also operated as the town's rescue boat (Radley 2019). The vessel still operates today out of Port Macquarie and is used as a training vessel for the Newman Senior Technical College.

The Captain and crew of the vessel (father Capt. Thomas Radley and brothers' Claude, Mervyn and Russell, along with Arthur Beattie and Raymond Smith) were all awarded Bravery Certificates by the Royal Shipwreck Relief and Humane Society of NSW for their efforts in rescuing the survivors despite, the grave peril they placed themselves in by doing so.

Bravery certificate presented to the Master of the XLCR Thomas Radley

The crew

Apart from the 5 survivors, the remaining crew of 32 (including Captain Benson) were killed in the attack and their bodies never found. Several would have gone down inside the ship with the wreck respected as a War Grave today. The youngest victim was seventeen-year-old deck boy Ken Durie, who died with his father, Third Engineer James Durie, aged 48. The oldest victim was Steward, Amos Waites, aged 64 years. The families of the crew were largely from Sydney, with United Kingdom-born Gwilym Wilcox being the only non-Australian member. Death notices placed after the war signal the impact of the losses, made harder by the secrecy of the times.

CARLSON - In ever loving memory of my beloved husband, Olof (Merchant Navy), who lost his life when his ship, S.S. Wollongbar, was torpedoed on April 29, 1943. Inserted by his loving wife. Amy Carlson. 6 Ewell Street,

Balmain. Sydney Morning Herald, 29 April 1946.

Hundreds of boxes of butter were washed ashore the night after the wreck, a boon in the depressed wartime rationing era where it was in short supply and was seen as “a gift from God”. Locals recount that there were “lots of cakes” in the area after the event, and children finding it on the beach would have butter fights, much to the dismay of their mothers when they returned home (Radley 2019). In 1954, boxes of butter from the wreck washed ashore at Point Plomer, near Port Macquarie, covered in barnacles**.**

Submarine I-180

Japanese submarine *I-180* was a *Kaidai* type (*KD7* sub-class) cruiser submarine of the Imperial Japanese Navy. Ordered in 1939, she was laid down at the Yokosuka Naval Arsenal on 17 April 1941 as *I-80*. Launched on 7 February 1942 and renumbered *I-180* she was ready for service in 15 January 1943. She completed one war patrol along Australia’s East Coast in March 1943 with sister submarines *I-177* and *I-178* after leaving Truk Lagoon in the Pacific.

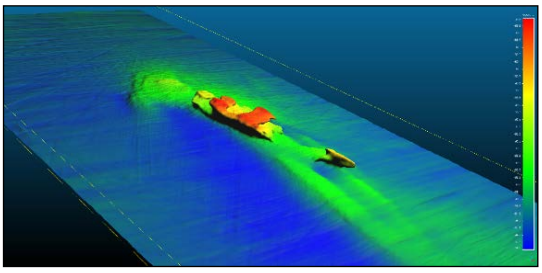
Sister submarine I-176

I-180 had a successful patrol off the Mid-North Coast sinking the *Wollongbar* (II) on 29 April 1943, the Norwegian merchant ship *Fingal* on 5 May 1943 off Coffs Harbour, and damaging the steamer’s *Ormiston* and *Caradale* on 12 May 1943 also in that area. Three days before sinking *Wollongbar*, on 26 April 1943, an unnamed vessel had a lucky break off Byron Bay with three torpedoes fired by *I-180* missing their target.

Wollongbar* (II) *builder’s half model donated from NCSNCo. MAAS collection, Create NSW.

Wreck Discovery and Survey

In 2019, the wreck was reported by Port Macquarie mariners. Heritage NSW (Dept. Premier and Cabinet) undertook the fieldwork to identify the remains of the vessel which had been reported by local mariner (Brett McKinnon). This included the first ever multibeam and sidescan sonar surveys, and Remotely Operated Vehicles (ROVs) to inspect, photograph and confirm the identity of the wreck. This work has confirmed that the wreck is the *Wollongbar* (II). This work was assisted by commercial operators (AUS ROV and Fish Port Macquarie).



Multibeam survey of the Wollongbar* (II) *(Image: AUS ROV)

Wreck site description

The wreck shows signs of extensive torpedo damage and has been blown up just aft of the bow and forward of the bridge, and at the stern just aft of the steam engine (behind the aft funnel). The stern section appears to be lying in pieces at a 90-degree angle to the rest of the vessel. The upper decks have been blown upwards as a result of the blast and have then collapsed back into the hull of the vessel. The wreck is in very poor

condition, with only sections of the midships and bow remaining partially intact. It is home to a previously unknown colony of the critically endangered grey nurse sharks.

Bow of Wollongbar* (II) *wreck (Image: AUS ROV)

View of aft torpedoed area at stern (Image: AUS ROV)

Torpedoed area just forward of the bridge (Image: AUS ROV)

Winch, anchor and fallen derrick crane (Image: AUS ROV)

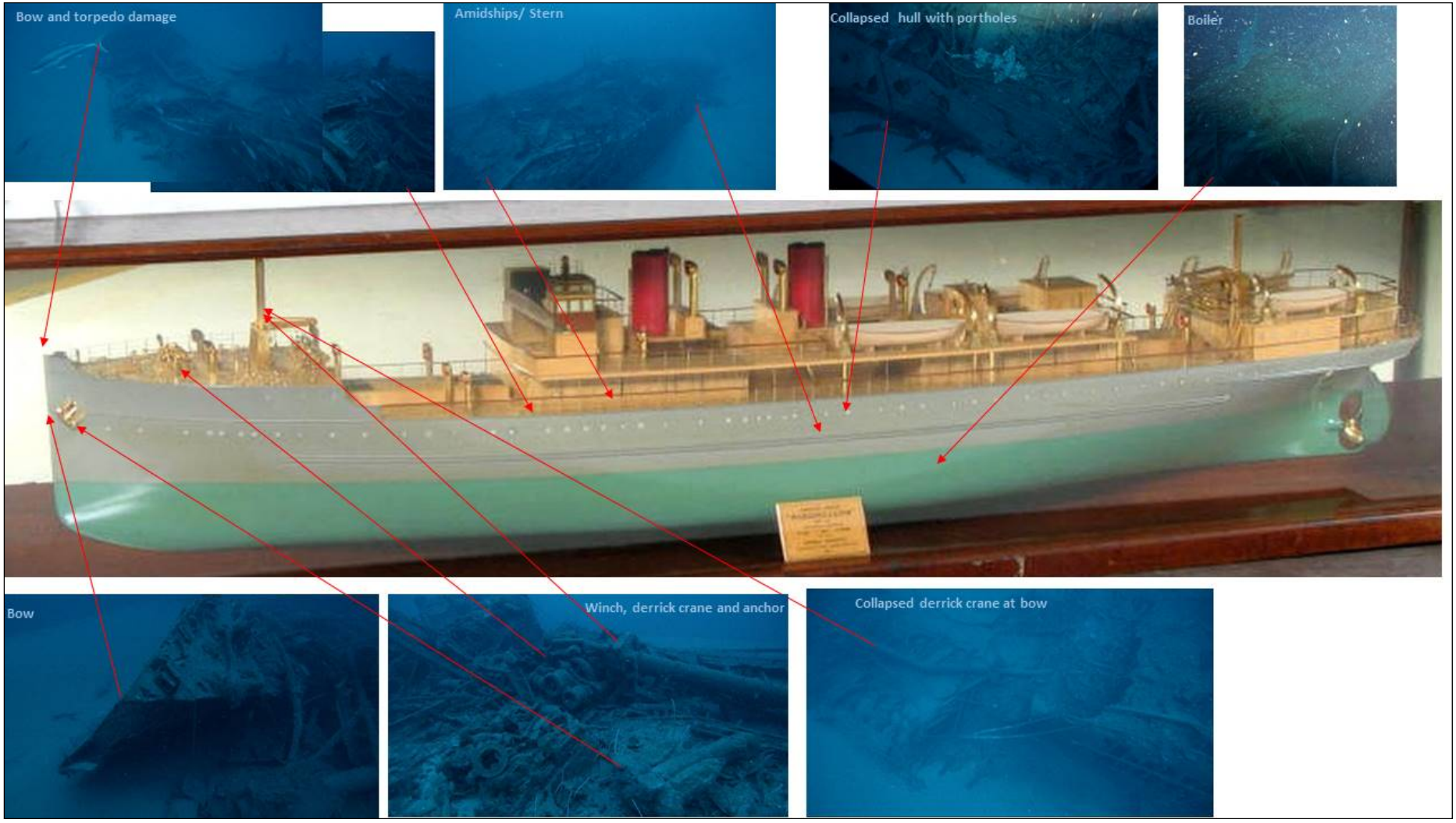
Protection

The wreck of the *Wollongbar* (II) was known to local commercial fishermen and has been surveyed by Heritage NSW, Department of Premier & Cabinet in September 2019 for the first time. The wreck and any associated human remains are protected by the Commonwealth *Underwater Cultural Heritage Act* 2018, and managed by Heritage NSW, Sydney. The remains of any mariners still present in the wreck are protected under the *NSW Coroners Act 2009*. The site is a significant place of loss and should be treated with respect for those lost in the incident

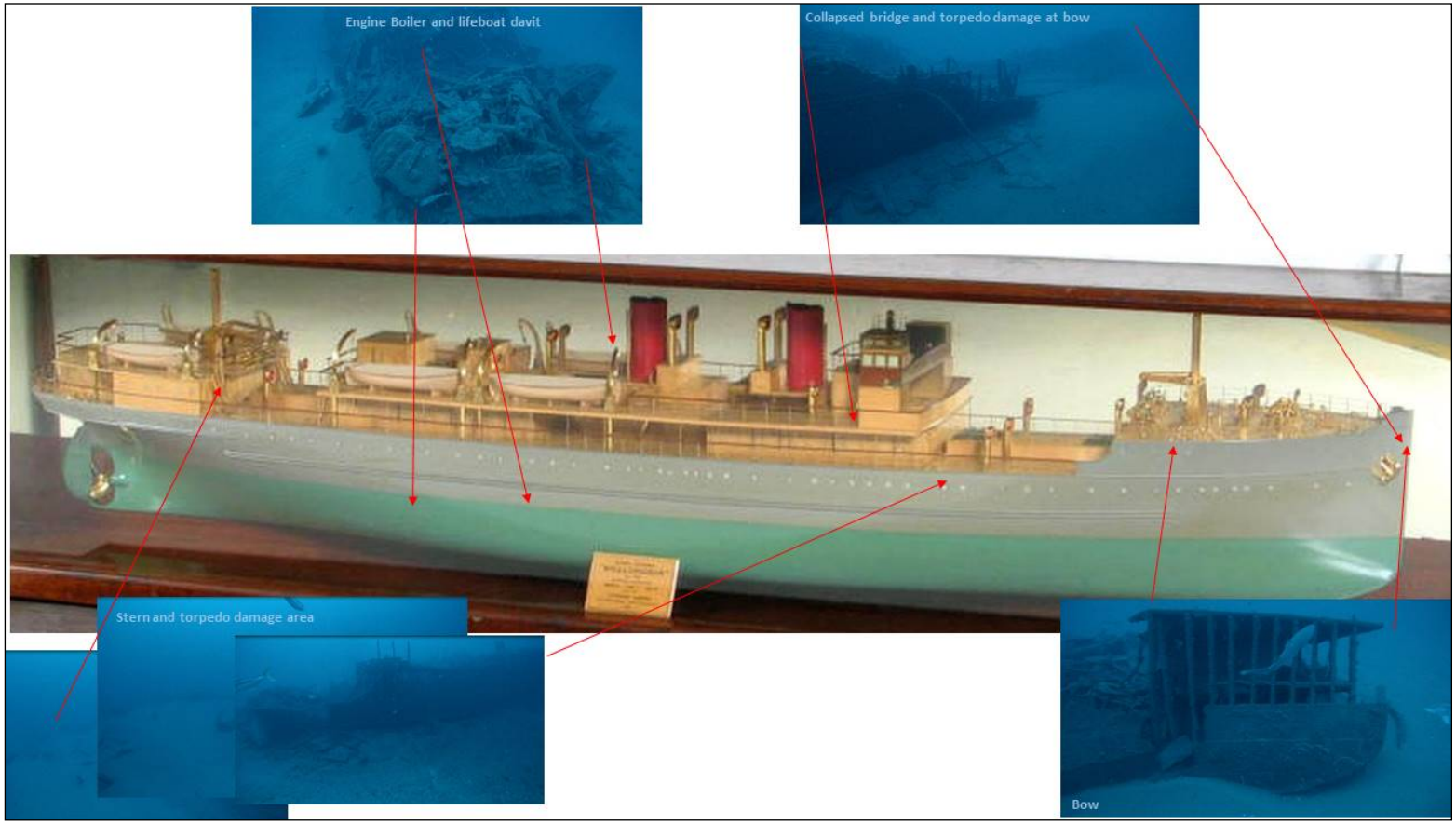
Copyright

Sources

- *Daily Examiner*, newspaper, 22 November 1945
- *Cooper, Ray, and Turner, Lynda, 2010, Sinking of the Wollongbar* (II)
- *Radley, Cec, 2019,* Interview by Brad Duncan 26 Sept 2019, Port Macquarie.
- *Lloyds Register of Ships*, London, 1943.
- 1945
- *Sydney Morning Herald*, 29 April 1946.
- *Western Mail,* 20 May 1954.
- The sinking of the *Wollongbar* (II) https://anzacportal.dva.gov.au/stories-service/australians-war-stories/sinking-wollongbar-ii
- Bob Hackett, Combined Fleet. http://www.combinedfleet.com/I-180.htm
- Wollongbar half-ship model, *Museum of Applied arts and Science* Collection: https://collection.maas.museum/object/242961
- Lithgows of the Port of Glasgow website collection: https://pudzeoch.smugmug.com/Ships/Lithgows-of-Port-Glasgow/i-dzcMB6
- https://en.wikipedia.org/wiki/Japanese_submarine_I-180



Schematic of ROV fieldwork results against ships model of the *Wollongbar* (II)



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