THE FURPHY

ARMADALE SUB-BRANCH OFFICIAL NEWSLETTER

September 2023 Edition

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Ph: (08) 9497 1972

email: secretary@armadalersl.com.au

Website: www.armadalersl.com.au

Social media: **Facebook**

General Meetings:	**Second Sunday of the month at 1030hrs**
Annual General Meeting:	**Second Sunday of September**

Committee Positions

Armadale Sub-Branch Committee	
President	Mr Ken Hepburn
Vice President	Mr Hans van de Velde
Secretary	Ms Carol King
Assistant Secretary	Mr Mike Fairweather
Treasurer	Mrs Cheryl Cowie
Assistant Treasurer	Vacant
Warden	Mr Graeme Cowie
Warden	Mr Bob Giles
Membership Officer	Mr Tom Rynn
Committee	Mr Laurie Sargeson
Committee	Mr Keith Northcott
Advocate / Welfare Officer	Mr Brent Errington
Bar Manager	Mr Mike Fairweather

ADVOCATE / WELFARE REPORT

(ERRO)

I currently am available as follows:

***Operating out of RAAFA* on Mondays and Fridays**

between 0900 – 1230hrs and also at

***Armadale RSL Sub-Branch* between 1000-1400hrs on Thursdays**

Contact Details: ***Mobile:*** ***0407 449 150***

e-mail: ***welfare2@armadalersl.com.au***

Diary Dates for September

Day	*Date*	*Event*	*Time*
Saturday	2nd	Social Committee Meeting	1100
Sunday	3rd	Austen Tayshus – Comedy Event	1400
Tuesday	5th	Management Committee Meeting	1830
Sunday	10th	Annual General Meeting	1030

PRESIDENTS REPORT

Hi Folks,

The Annual General Meeting (AGM) will be on Sunday 10th of September 2023 at 1030 hours. Look forward to seeing you there!

This year marks 104 years since Armadale Returned and Services Sub-Branch was raised, and it is a very proud club within the Armadale Community. The Sub-Branch is run by volunteers, and it needs the support from all our Service Members to fill the Committee positions; otherwise, the Sub-Branch may close. Even if you cannot take on a position on the committee, by attending the Sub-Branch on the days we are open, this will help the club financially by your attendance in having a drink and buying raffle tickets.

I would like to thank the Secretary and Bar Manager, for your help in running the afternoon tea, for our Korean Veteran and our Vietnam Veterans. It was a small turn out, but thanks to those who attended to pay their respect to them.

I would like to thank the Sub-Branch Committee and the Social Committee, for all their effects in supporting the RSL and providing a friendly environment for members to attend, well done.

To the regular members, who attend the club on Fridays and Sundays, thank you for your support of our club.

Regards,

Ken Hepburn

President

Returned Services League Armadale Sub-Branch
Ph: (08) 9497 1972. M: 0428 001 949

email: president@armadalersl.com.au
Website: www.armadalersl.com.au

Secretary's Notes

Hi Everyone,

We have our Father's Day Comedy Event on Sunday 3rd September, so time is running out to purchase tickets if you wish to attend.

We are planning on having more entertainment coming up, however if we do not have enough interest in these events, we may need to re-consider.

Nomination Forms are on the board for the vacant positions which will be voted on at the upcoming AGM on 10th September.

The positions are: *President*
Treasurer
Wardens (x2)

All Committee positions (x6) will be filled from the floor on the day.

Please make an effort to attend.

Best regards to all,

Carol King

Sub-Branch Secretary

Armor piercing shell from a 17-pdr gun embedded in a section of armour from a Tiger I tank

First Nations People have been protecting our country in various ways for more than 60,000 years

Aboriginal Service People

Military service and war is a significant part of our mob's history and current experience. Aboriginal and Torres Strait Islander people have served in large numbers in every conflict since Australia's Federation in 1901 and some signed up to colonial forces before this.
It is hard to know the exact number of Aboriginal and Torres Strait Islander service people because the Australian Defence Force did not record the cultural background of members until recently. In the early 1900s Aboriginal and Torres Strait Islander people were not legally able to join the Army, so many hid their identity in order to sign up.
Aboriginal and Torres Strait Islander people have also been involved in work at home to support the war effort. For example, during World War II, entire Aboriginal communities in Northern Australia did defence work such as construction, farming and butchery for the army.
There have also been Aboriginal and Torres Strait Islander units. During World War II, the Torres Strait Light Infantry was started to patrol the Torres Strait Islands and support ships going through their waterways. At the same time the Northern Territory Special Reconnaissance Unit was formed. This unit was made up of Yolngu men from Arnhem Land and aimed to use Aboriginal tactics and weaponry to fight the Japanese military. In 1981, the North West Mobile Force or NORFORCE was created in the Northern Territory. This unit continues today and has 60% Aboriginal membership.

Burt Community Volunteer Awards 2023

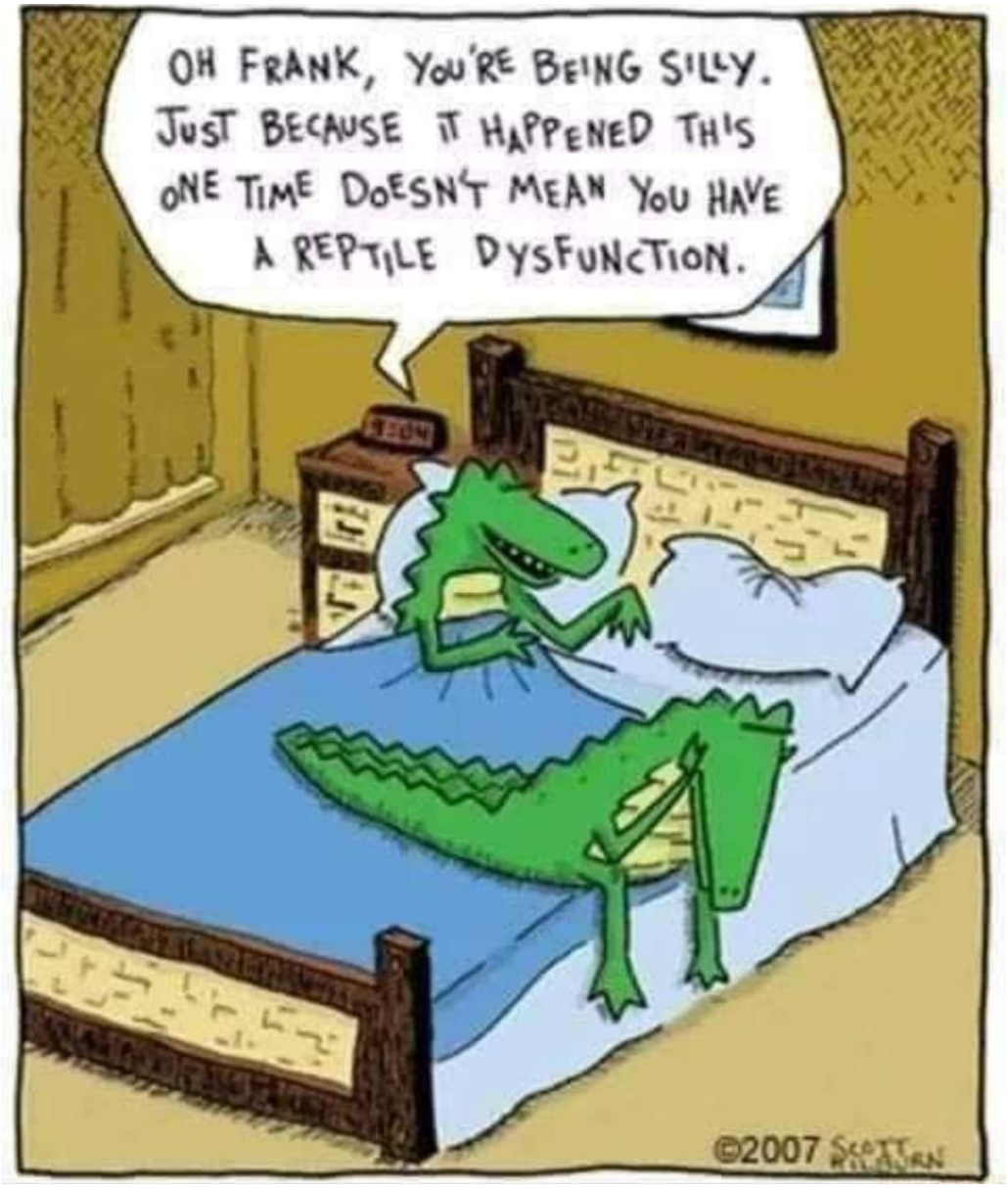
Federal Minister for Veteran's Affairs, Matt Keogh presenting certificates to Armadale RSL Sub-Branch Members Bob Giles and Lois Davis in recognition of their outstanding Community Service achievements

Charlotte Elizabeth Webb, MBE (née Vine-Stevens; born 13 May 1923) worked as a code breaker at Bletchley Park during World War II at the age of 18. Starting in 1941 she joined the British Auxiliary Territorial Service. She said, of joining the top-secret mission at Bletchley, "I wanted to do something more for the war effort than bake sausage rolls."

Webb grew up with a German au pair before becoming an exchange student in Germany. Upon arrival at Bletchley she was tasked with cataloguing encrypted German radio messages intercepted by the British, contributing to the breaking of the German cipher Enigma. During her time at Bletchley she also worked on intercepted Japanese messages. After the war ended in Europe, Webb travelled to Washington D.C. to assist the Americans with the war in the Pacific.

Webb was awarded an MBE in 2015. In 2021, Webb's work at Bletchley Park was recognized by the government of France with the award of the Légion d'Honneur.

As of February 2021, Webb lived in Worcestershire, England and turned 100 in May 2023.



An older lady was standing at the rail of a cruise ship holding her hat so that the wind wouldn't blow it away.

A gentleman approached her and said, "Pardon me, madam, I do not intend to be forward but did you know that your dress is blowing up in this wind?"

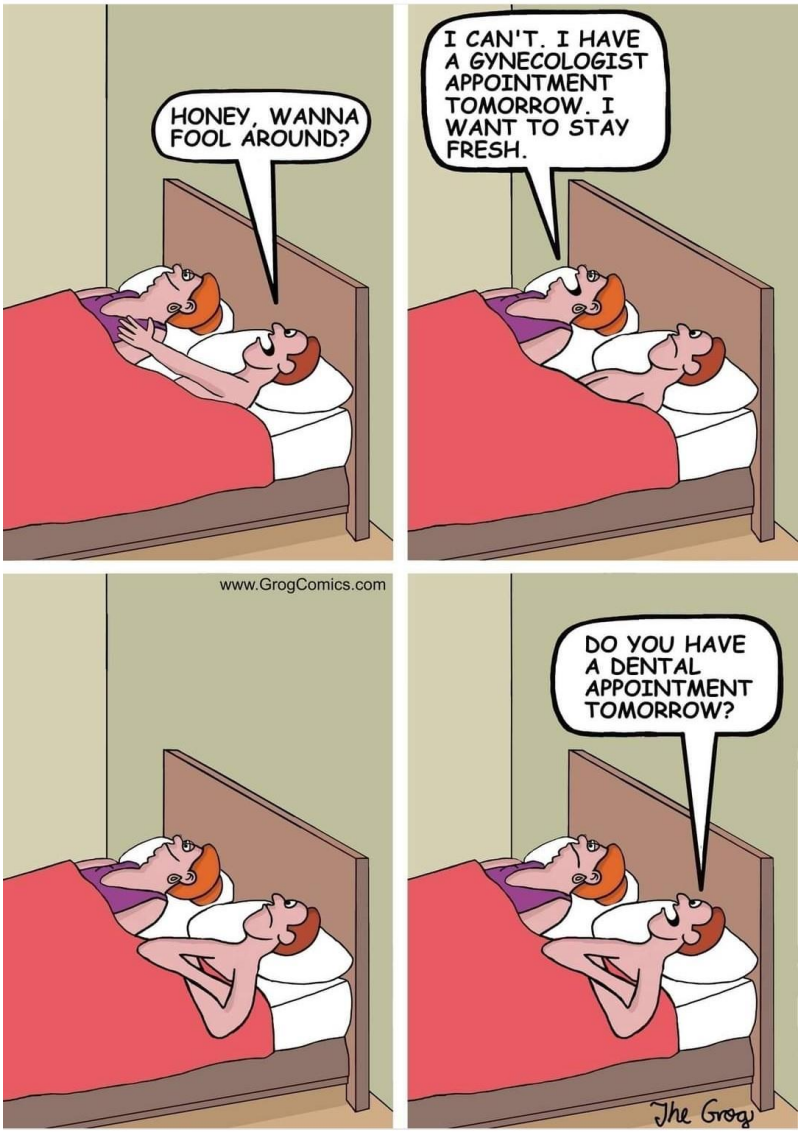
" Yes, I know," said the lady. "But I need my hands to hold on to my hat".

"But madam", he said "you must know that your derriere is exposed!"

The woman looked down, then back up at the man and said, "Sir anything you see down there is 85 years old, but I just bought this hat!"

Annie Bagg with her parents, Soloman and Eliza Bagg are doing laundry and tending their garden on Hill Road in Southampton. The Rockleigh Road is lined with parked cars and armored vehicles belonging to an American Field Artillery Battalion. Before the invasion, much of the south coast had become a huge parking lot for the Allied armies

"A 20mm cannon shell entered the top turret, hit the armor plate on back of my seat and exploded, knocking out the left side window and puncturing my eardrum, showering plexi-glass all over. Only me and the laundress know how close this one came"



The *Matilda Tank!*

Australian Ford T equipped with Vickers MG between 1917 and 1918 in Middle East

Membership Update

as at 30th September, 2023

Service Members:	**179**
Affiliate Members:	**44**
Social Members:	**67**
Total:	**290**

Please contact me for any information on membership.

Tom Rynn

Tel: 0439 934 285
E-mail: tomrynn@bigpond.com

HMAS Canberra sits at Fort Hill Wharf in Darwin, ready to set sail for Exercise Alon as part of Indo-Pacific Endeavour 2023

Our long time Sub-Branch member Neville "Nifty" Dwyer at the opening of the Korean War Memorial August, 2023

September Service Members:

Casey	Mr	Damian	30/09	Casey	Mr	Tyrone	12/09
Clements	Mr	Trevor	27/09	Dempster	Mr	John	24/09
Earl	Mr	Brad	13/09	Ewers	Mr	Richard	14/09
Hackshaw	Mr	Mitchell	27/09	Johnson	Mr	Richard	11/09
Kealy-Bateman	Ms	Marcelle	19/09	Kearn	Mr	Richard	05/09
Maskiell	Mr	Joseph	16/09	McCarthy	Mr	John	17/09
Messenger	Mr	Rodney	11/09	Meyer	Mr	Steven	06/09
Michelsen	Mr	Ivan	19/09	Reilly	Mr	Bruce	06/09
Reynolds	Mr	Linton	09/09	Sheridan	Mr	Brian	24/09
Treasure	Mr	Colin	26/09	Veernan	Mr	Henrie	22/09
Van De Velde	Mr	Johannes	23/09				

September Affiliate Members:

Burgess	Mr	Bradley	26/09	Karsten	Mrs	Janeen	23/09
Paul	Mr	David	22/09	Reeves	Mr	Anthony	30/09

September Social Members:

Burroughs	Mr	Andrew	03/09	James	Ms	Stephanie	19/09
Thoroddsson	Mr	Agust	15/09	Reed	Ms	Rosemary	02/09

If anyone has been missed off the list, please advise
Tom Rynn (Membership Officer)

These members may collect a free drink of their choice during the month

We hope you have a very special Birthday

Bar Manager's Report

G'day All,

Well, there is another year gone it's AGM time.
And Club Inc. has almost run its course, but the bar will still be operating at a profit I hope.

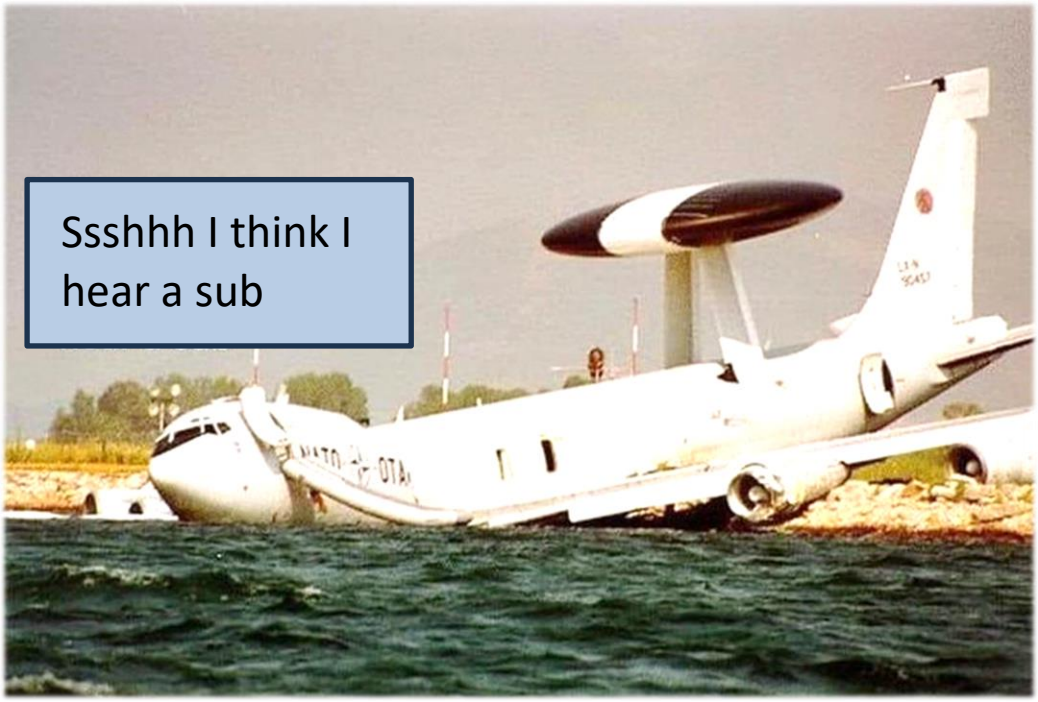
It has been a reasonably good year and we hope we have more members coming in, new and old.

There seem to be a bit of controversy about the Loyalty Point system. Points have been set at 10% regardless of what some may believe. Should anyone have a query please bring their card to me and I can show them on the Bpoz Back Office computer to confirm how these are set.

A new beer will be coming to replace the Carlton Mid Keg, however we have not yet made a decision on what that alternative will be.

Stormy

Apparently saying, "Oh, this old thing?" isn't an appropriate way to introduce my wife.



ACTUAL COMPLAINTS RECEIVED BY "THOMAS COOK VACATIONS" FROM DISSATISFIED CUSTOMERS

- "They should not allow topless sunbathing on the beach. It was very distracting for my husband who just wanted to relax."
- "On my holiday to Goa in India, I was disgusted to find that almost every restaurant served curry. I don't like spicy food."
- "We went on holiday to Spain and had a problem with the taxi drivers as they were all Spanish."
- "We booked an excursion to a water park, but no-one told us we had to bring our own swimsuits and towels. We assumed it would be included in the price."
- "The beach was too sandy. We had to clean everything when we returned to our room."
- "We found the sand was not like the sand in the brochure. Your brochure shows the sand as white, but it was more yellow."
- "It's lazy of the local shopkeepers in Puerto Vallartato close in the afternoons. I often needed to buy things during 'siesta' time -- this should be banned."
- "No-one told us there would be fish in the water. The children were scared."
- "Although the brochure said that there was a fully equipped kitchen, there was no egg-slicer in the drawers."
- "I think it should be explained in the brochure that the local convenience store does not sell proper biscuits like custard creams or ginger nuts."
- "The roads were uneven and bumpy, so we could not read the local guide book during the bus ride to the resort. Because of this, we were unaware of many things that would have made our holiday more fun."
- "It took us nine hours to fly home from Jamaica to England. It took the Americans only three hours to get home. This seems unfair."
- "I compared the size of our one-bedroom suite to our friends' three-bedroom and ours was significantly smaller."
- "The brochure stated: 'No hairdressers at the resort.' We're trainee hairdressers and we think they knew and made us wait longer for service."
- "When we were in Spain, there were too many Spanish people there. The receptionist spoke Spanish, the food was Spanish. No one told us that there would be so many foreigners."
- "We had to line up outside to catch the boat and there was no air-conditioning."
- "It is your duty as a tour operator to advise us of noisy or unruly guests before we travel."
- "I was bitten by a mosquito. The brochure did not mention mosquitoes."
- "My fiancée and I requested twin-beds when we booked, but instead we were placed in a room with a king bed. We now hold you responsible and want to be re-reimbursed for the fact that I became pregnant. This would not have happened if you had put us in the room that we booked."

Byford Rail Extension - Update

MetCONNX

The Armadale Line Shutdown will commence on 20 November 2023.

During the closure, 5.5 kilometres of elevated rail will be built, along with seven new stations, and the extension of the line to Byford.

As most of the work in the immediate area of the RSL has been completed, it is anticipated that there will be minimal disruption to the RSL and its Members for quite some time.

The current Trans Perth Car Park will remain operational for public parking until at least the end of 2024 although there may be a small fee charged on week days. Weekend parking is free.

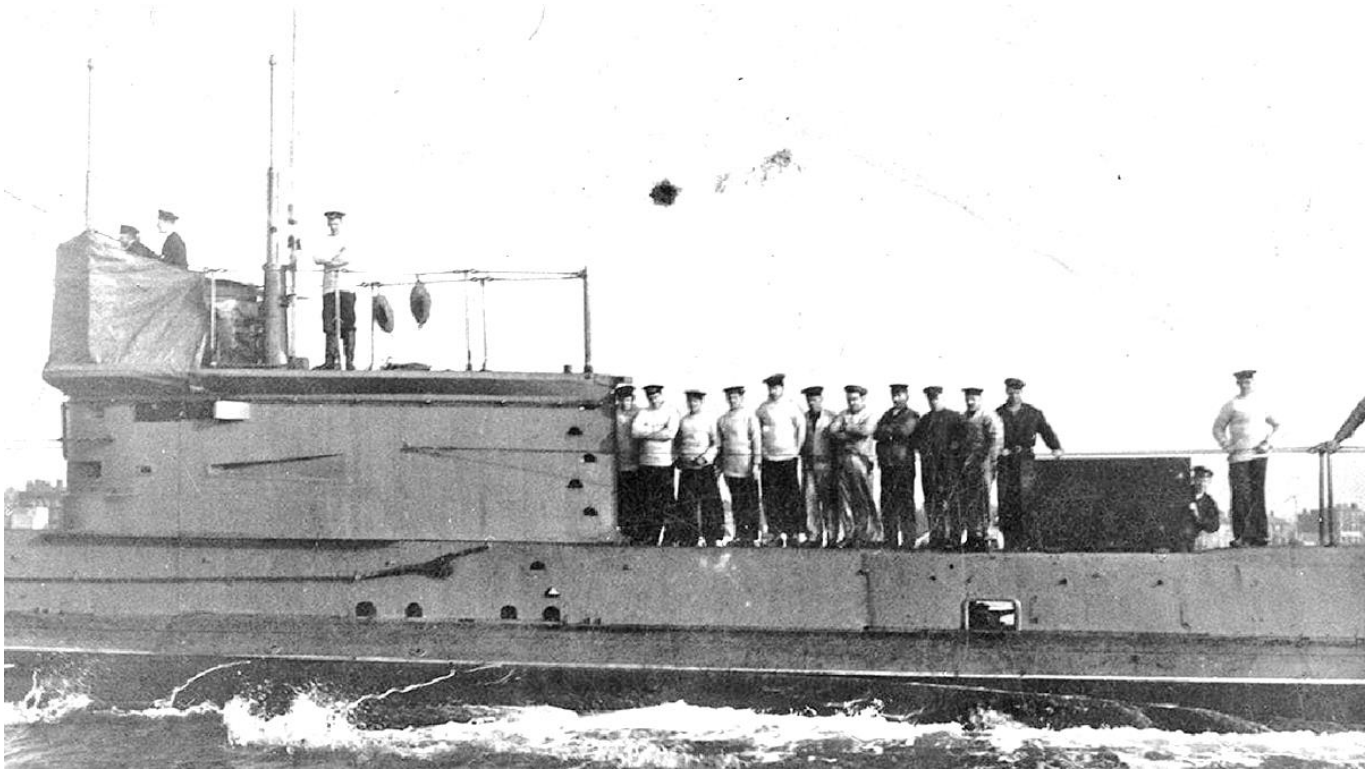
Every door gunner dreamed of having lots of firepower.

"I know the kids don't like you and pick on you, but you have to go to school...you're the teacher."

Significant September Event

The Disappearance of Submarine HMAS AE1 - 14 September 1914
Australia's most enduring Naval Mystery

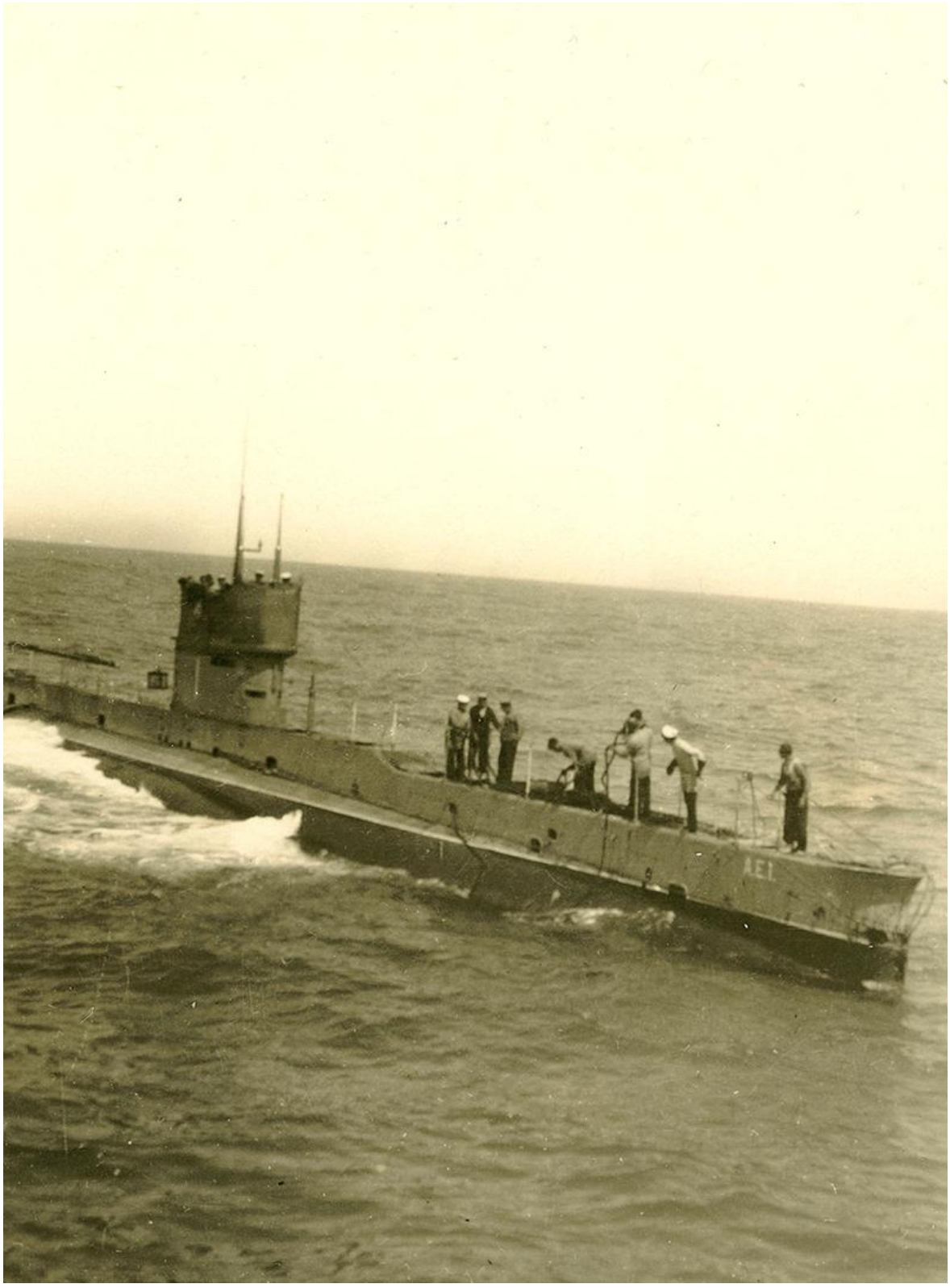
On 20 December 2017, a collaborative team comprising researchers and specialists from the Silentworld Foundation (SWF), Australian National Maritime Museum (ANMM), Find AE1 Ltd., the Royal Australian Navy (RAN) and Fugro, N.V. identified the final resting place of HMAS AE1 off the Duke of York Islands in Papua New Guinea. The discovery of Australia's first submarine was the culmination of more than a century of efforts to solve the riddle of its disappearance in September 1914, and learn the fate of its crew of 35. Information gleaned from the 2017 survey, as well as a follow-up ROV examination in April 2018, has at last revealed the cause of AE1's loss, and brought closure to Australia's oldest naval mystery.



AE1 at Portsmouth, England in early 1914 shortly after being commissioned into the Royal Australian Navy

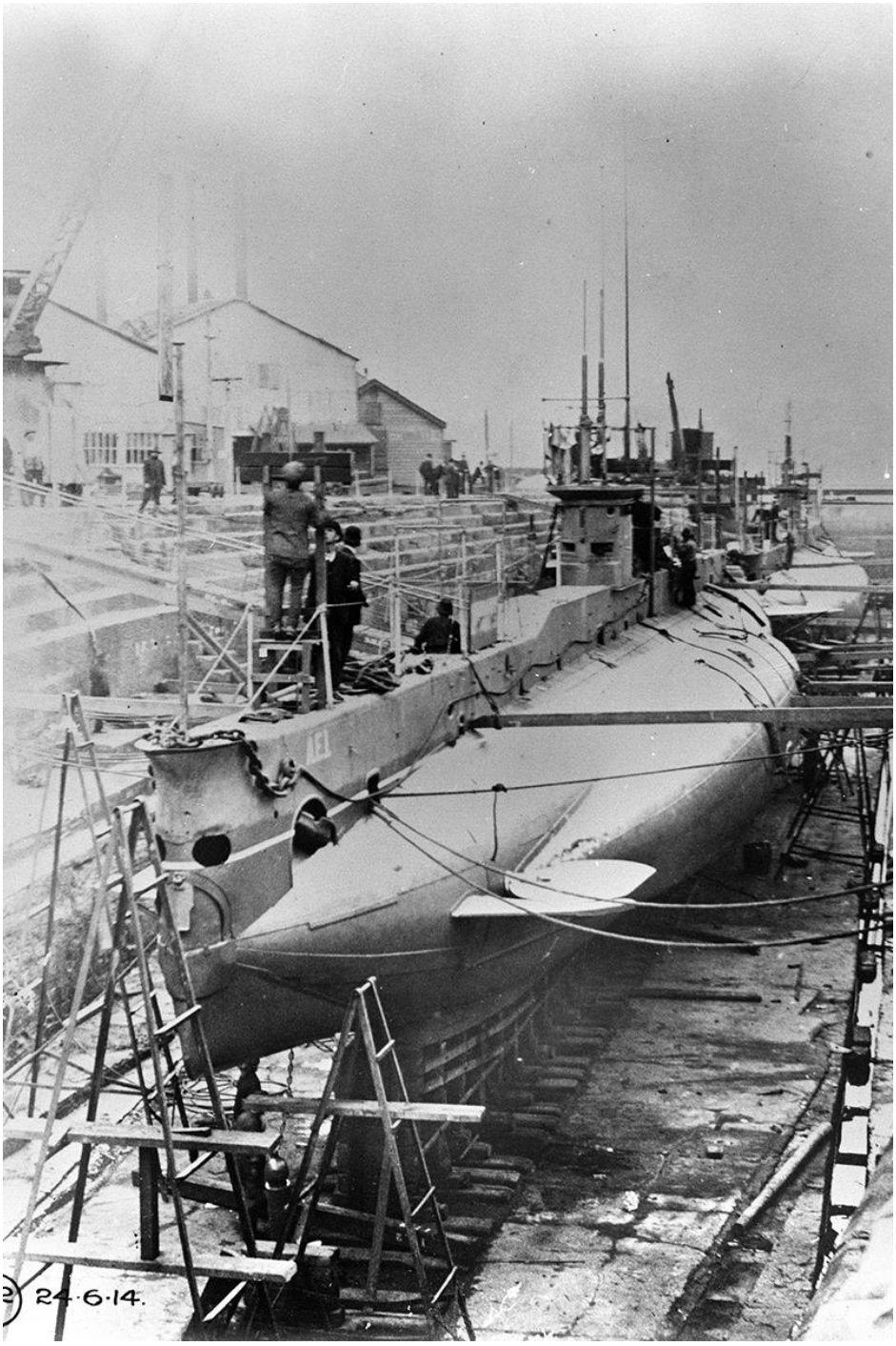
Submarine *AE1*
The establishment of the RAN in 1911 coincided with revolutionary changes in naval tactics and technology. The British Admiralty's First Sea Lord, Admiral Sir John 'Jacky' Fisher, foresaw the immense value of submarines in naval warfare, and recommended their use in the Royal and Commonwealth navies. This, and their relative affordability, led Australian Prime Minister Alfred Deakin to commit the RAN to buy two submarines for its new fleet.

AE1, the first to be built, was laid down in November 1911 at the British shipyard of Vickers Armstrong Ltd. It was launched two years later, commissioned into the RAN on 28 February 1914, and then voyaged to Australia with its sister-submarine *AE2*. Both boats were commanded by Royal Navy officers and crewed by a mix of British and Australian ratings. *AE1*'s crew also included one New Zealander.



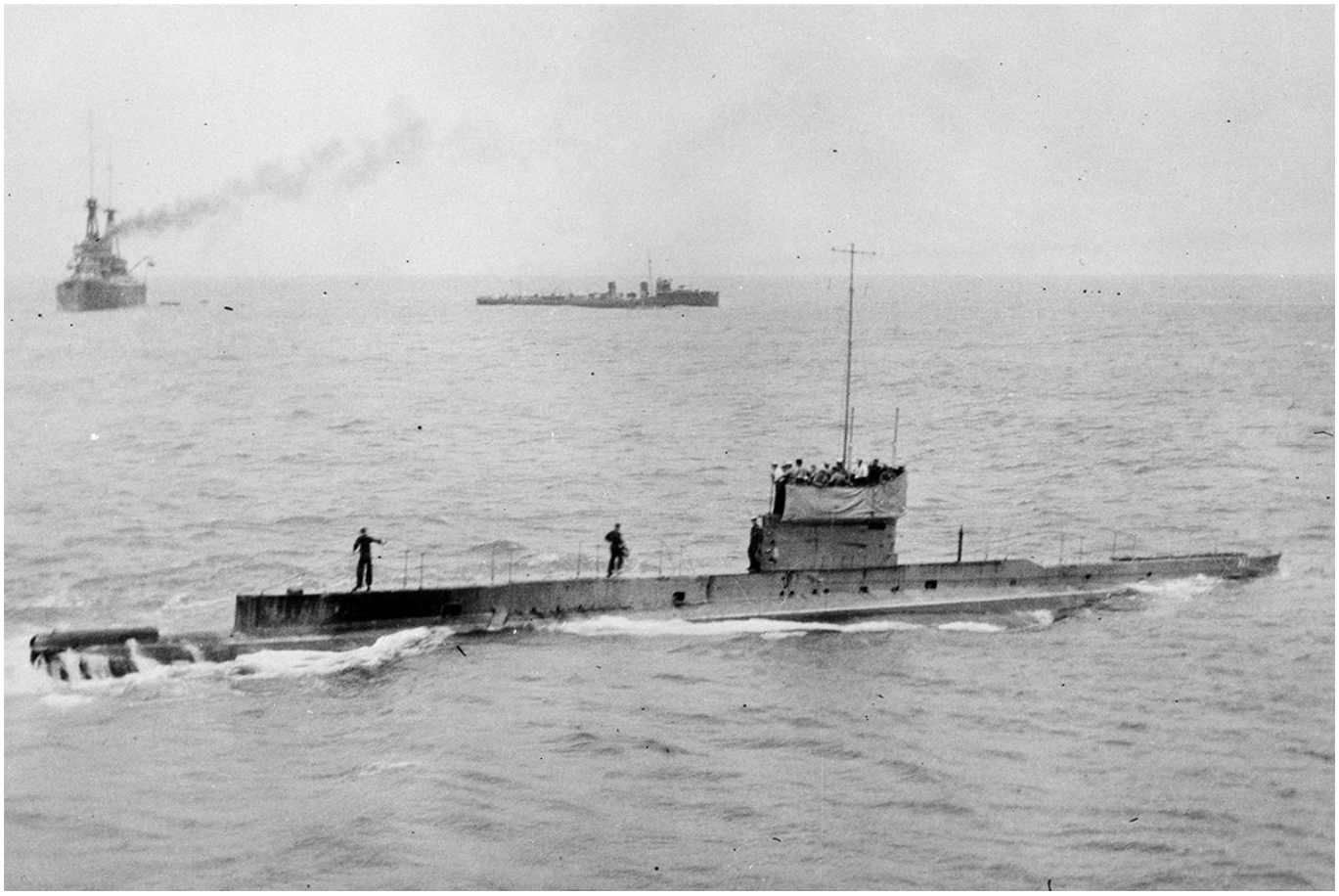
AE1 preparing to be towed while on its delivery voyage to Australia, 1914. The trip spanned a distance of nearly 21,000 kilometres and was the world's longest submarine transit at the time

Following the outbreak of the First World War, *AE1* joined the Australian Naval and Military Expeditionary Force (ANMEF) and departed for German New Guinea. The ANMEF was tasked with seizing and destroying German wireless stations there and in the southwest Pacific islands. These combined operations resulted in the surrender of Rabaul on 13 September 1914, and the beginning of Allied occupation of German New Guinea. On the morning of 14 September 1914, *AE1* departed Rabaul to patrol for German warships with the torpedo boat destroyer HMAS *Parramatta* (I). The two vessels separated during the late morning but rendezvoused in the afternoon. At 3:20 pm, *Parramatta*'s crew lost sight of the submarine off the Duke of York Islands and couldn't re-establish contact. *Parramatta*'s commander was not concerned, as he assumed *AE1* had returned to Rabaul.



AE1 undergoing refit at Cockatoo Island Dockyard in June 1914. Its sister-submarine AE2 is visible in the background

Concerns about *AE1* only emerged when the submarine failed to return to Rabaul by 8:00 pm. A search started immediately and included several Australian warships. Despite covering a vast area that included *AE1*'s most probable return course south and east of the Duke of York Islands, no trace of the submarine was ever found. One Australian crew observed an oil slick, but this was disregarded, as it was 30 nautical miles (56 kilometres) northwest of *AE1*'s last known position. After three days, the search was called off. An inquiry concluded that the submarine most likely struck a submerged reef while diving and then sank in deep water. *AE1*'s loss exacted a terrible toll: the incident claimed three officers and 32 crew. It was the RAN's first wartime vessel loss, and would become Australia's most enduring naval mystery.



The last known photograph of AE1 prior to its disappearance shows the submarine near Rossel (Yela) Island in the Louisiade Archipelago on 9 September 1914

Modern searches

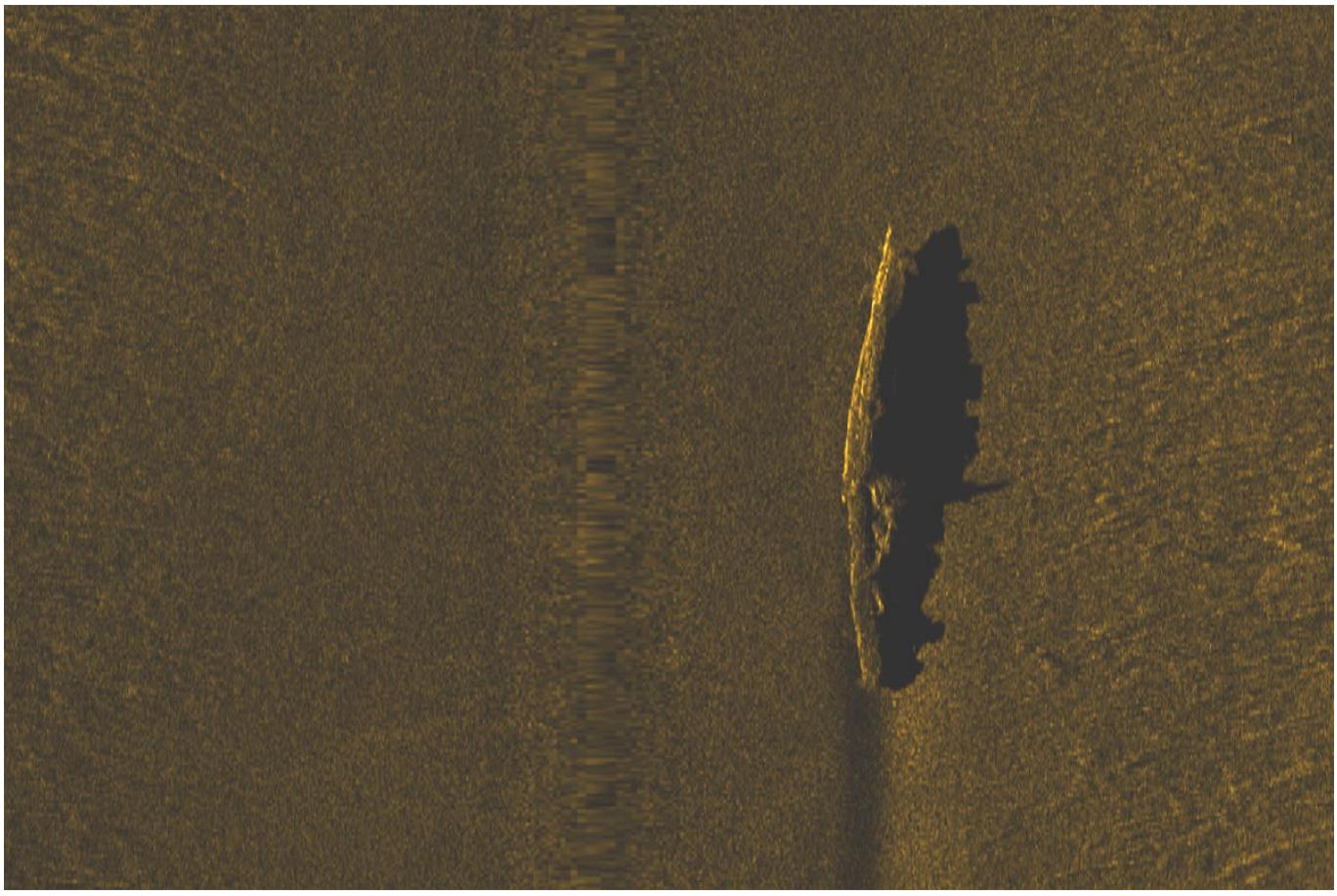
For more than 60 years the submarine and its crew were largely forgotten. Renewed interest in finding *AE1* commenced during the 1970s through the efforts of Commander John Foster, Australia's then-Assistant Defence Attaché to Papua New Guinea. Foster was intrigued by the submarine's disappearance and consulted various Australian archives to try to identify its loss location. In 1976, Foster surveyed a possible location with a RAN hydrographic survey ship. The survey was unsuccessful. Undeterred, Foster continued to scour relevant archives, visited Rabaul and the Duke of York Islands to determine if *AE1* was mentioned in the oral histories of local residents, and organised additional searches in 2002, 2003, 2007

and 2009. All were unsuccessful. Jacques Cousteau also attempted to locate *AE1* while transiting between New Britain and New Ireland in 1990, but failed to detect anything of interest.

Commander John Foster, RAN (centre) disembarking from the Royal Australian Navy's survey motor launch HMAS Benalla*, 27 February 2007. Foster directed efforts to locate* AE1 *between the 1970s and his death in 2010*

HMAS Benalla conducts a multi-beam sonar survey for AE1 off Mioko Island, February 2007

In 2014, a RAN minesweeper searched for *AE1* in waters directly east of Mioko Island, a small islet off the east coast of the Duke of York Islands. One year later, the non-profit organisation Find AE1 Ltd. undertook a multi-beam echo sounder (MBES) survey in deep waters east and south of the Duke of York Islands. Both searches detected numerous intriguing anomalies, but all were ruled out as the wreck of the long-lost submarine. In the wake of the 2015 expedition, Find AE1 Ltd. organised a workshop at ANMM with the goal of re-evaluating *AE1*'s final voyage and determining its most likely loss location based on the results of archival research, predictive modelling, and prior searches. By late 2017, a high-priority survey area was established.

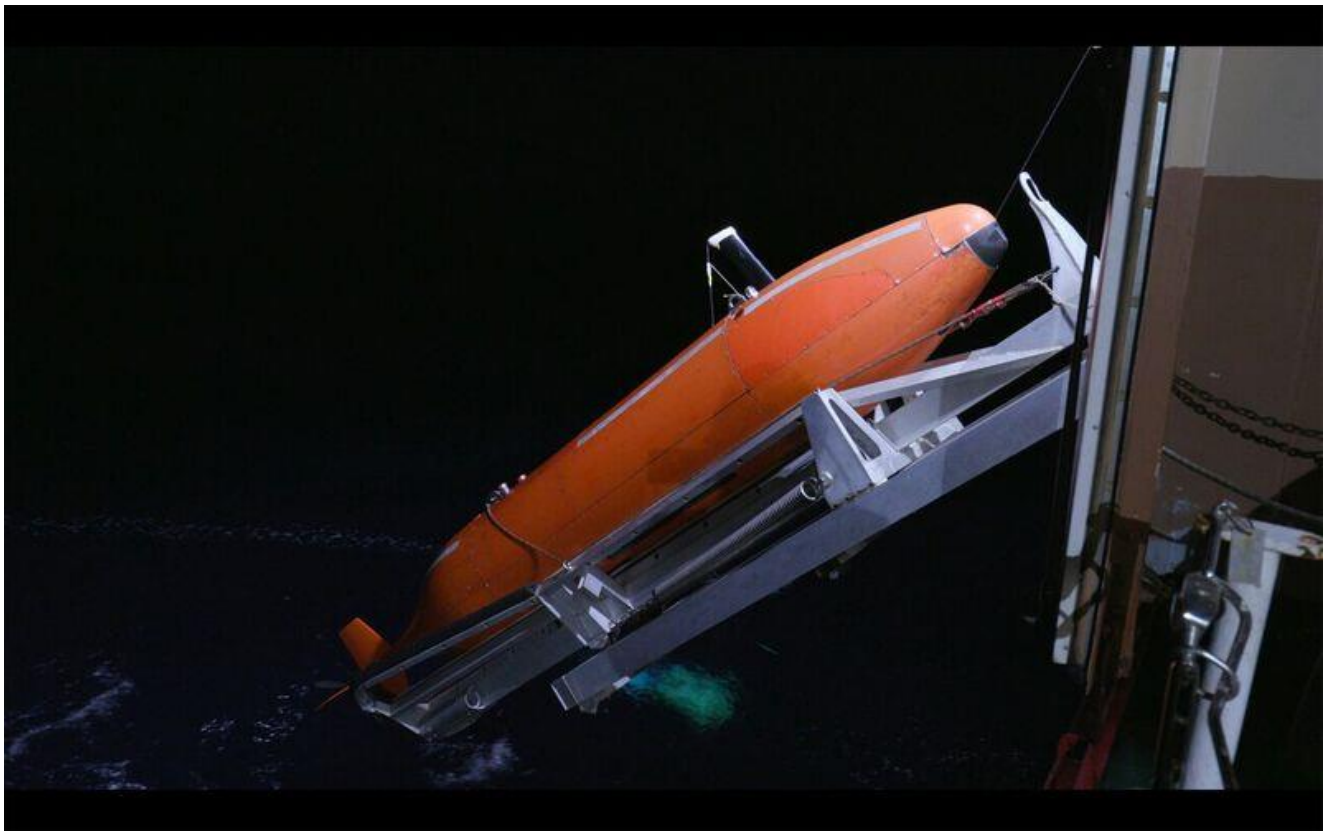


This image acquired by the AUV's side scan sonar provided the first glimpse of AE1 since its disappearance in September 1914

Success

The 2017 expedition was originally slated for 2018, but commenced ahead of schedule due to a generous offer from Fugro N.V. for the use of one of its deep-water survey vessels, *Fugro Equator*. John Mullen, founder and director of SWF, gave his personal guarantee for half of the funding required to undertake the search for *AE1*. With SWF's financial guarantee in place, the Australian Government committed the other half, thereby ensuring the survey would proceed. SWF also launched a fundraising campaign in the lead-up to the expedition and secured the support of several corporate sponsors. Additional financial support for the project was provided by the Submarine Institute of Australia, ANMM and Fugro N.V. Members of Find AE1 Ltd. provided expertise relevant to *AE1*'s history, operation and engineering, while the expedition's maritime archaeologists were drawn from SWF and

ANMM. RAN personnel served as project and media liaisons for the Australian Government. Operation of survey equipment and processing of data was performed by *Fugro Equator*'s remote-sensing specialists.



Fugro Equator's *Autonomous Underwater Vehicle (AUV) conducted a pre-programmed search of the seabed in the survey area with an array of in-built sonar equipment*

A drop-camera was used to examine the side scan sonar 'contact of interest' that was ultimately identified as AE1

Members of the Find AE1 *expedition team with representatives from Fugro Survey in Simpson Harbour, Rabaul, Papua New Guinea. From left: Tanesh Thanapalan (Fugro Survey), Paul Hundley (Silentworld Foundation), Rear Admiral Peter Briggs AO CSC RAN(Rtd) (Find AE1 Ltd), Captain Roger Turner RN Rtd (Find AE1 Ltd), Chandran Karapiah (Fugro Survey), Lieutenant James McPherson RANR (Royal Australian Navy), Gus Mellon (Find AE1 Ltd), Andrej Masloboev (Fugro Survey), Magnus Windle (Fugro Survey), Nigel Erskine (Australian National Maritime Museum), Irini Malliaros (Silentworld Foundation)*

The research team assembled in Papua New Guinea in mid-December 2017 to commence the search. *Fugro Equator* deployed an array of cutting-edge marine survey equipment, including a hull-mounted MBES and an Autonomous Underwater Vehicle (AUV). The AUV was launched from the ship and systematically searched the survey area with its own inbuilt MBES system, as well as side-scan sonar and a sub-bottom profiler.

On 19 December 2017, the AUV detected a promising sonar contact at a depth of over 300 metres. A drop-camera was deployed the following morning to allow the expedition team to examine it in greater detail. Still and video imagery broadcast into *Fugro Equator*'s control room revealed unmistakable features of *AE1*'s hull, including its fore and aft hydroplanes, twin periscopes, and distinct fin (the casing that surrounds the conning tower). The AUV was then re-deployed to the site, and captured thousands of high-resolution still images as it passed over the hull. These were later stitched together to form a comprehensive photomosaic.

A detailed two-dimensional photomosaic of AE1 was generated from over 6,000 digital images taken by Fugro Equator's AUV

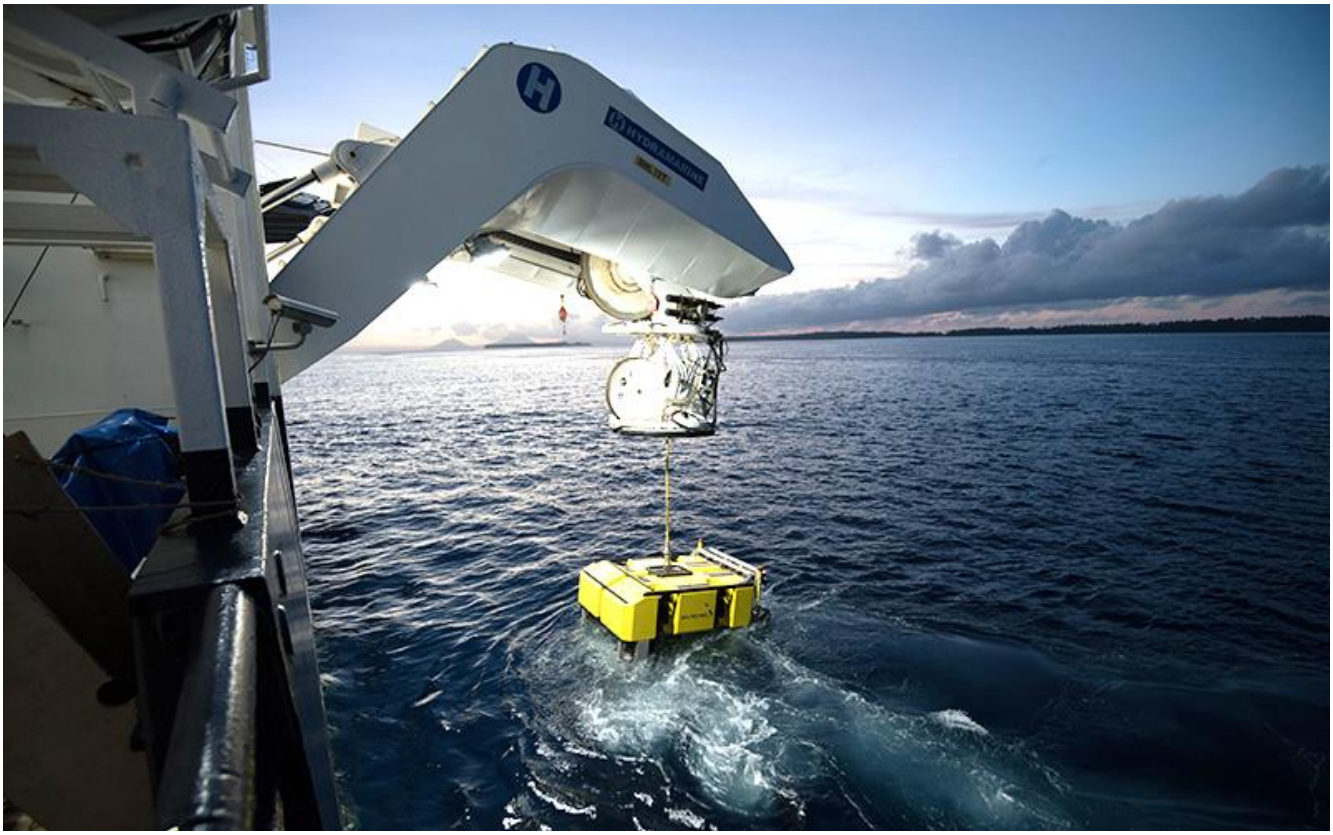
Archaeological examination and photogrammetric survey

The mystery of *AE1*'s final resting place was now solved, but why the submarine sank was still an open question. Although imagery from the 2017 expedition provided important clues, an opportunity arose in early 2018 to return to *AE1* for a closer look.

In April, a collaborative team consisting of researchers from ANMM, Find AE1 Ltd., and Curtin University's HIVE (Hub for Immersive Visualisation and eResearch) participated in a Remotely-Operated Vehicle (ROV) examination of the submarine. The ROV examination was conducted *gratis* from R/V *Petrel*, a research vessel owned by Microsoft co-founder Paul G. Allen and operated by Vulcan, Inc., the company that oversees Mr. Allen's network of philanthropic organizations and initiatives.

The mystery of AE1's final resting place was now solved, but why the submarine sank was still an open question...

Because *AE1* is located in over 300 metres of water, the site examination was conducted via *Petrel*'s Work-Class ROV, which was outfitted with an array of Standard- and High-Definition video cameras. These cameras were augmented by a specially designed 12-megapixel deep-water digital still camera provided by Curtin University and the Western Australian Museum (WAM) for the purpose of developing a 3D photogrammetric model of the shipwreck site. The same camera had been used, amongst a suite of photographic equipment, by Curtin University and WAM to capture photogrammetric imagery of the Second World War shipwrecks HMAS *Sydney* (II) and HSK *Kormoran* in 2015.



Petrel's *ROV is launched during the 2018 examination of* AE1*. The ROV has a maximum depth limit of 6,000 metres and was outfitted with an array of still and video cameras. Image: Paul G. Allen, Find AE1 Ltd., ANMM and Curtin University*

Expedition members participating in the 2018 ROV examination of AE1 *watch live footage of the submarine's stern torpedo tube in the control room aboard the research vessel Petrel*

Archaeological examination and documentation of *AE1* took place over the course of two days and involved five separate dives by *Petrel*'s ROV. The first dive confirmed the submarine's location and identity and served as an opportunity for the ROV operators to familiarise themselves with the wreck site and its environmental conditions, and identify potential hazards (such as protruding structure that could foul the ROV's tether). It also provided the research team with its first detailed glimpse of *AE1*, which proved useful in identifying features of interest and refining the survey strategy for subsequent dives.

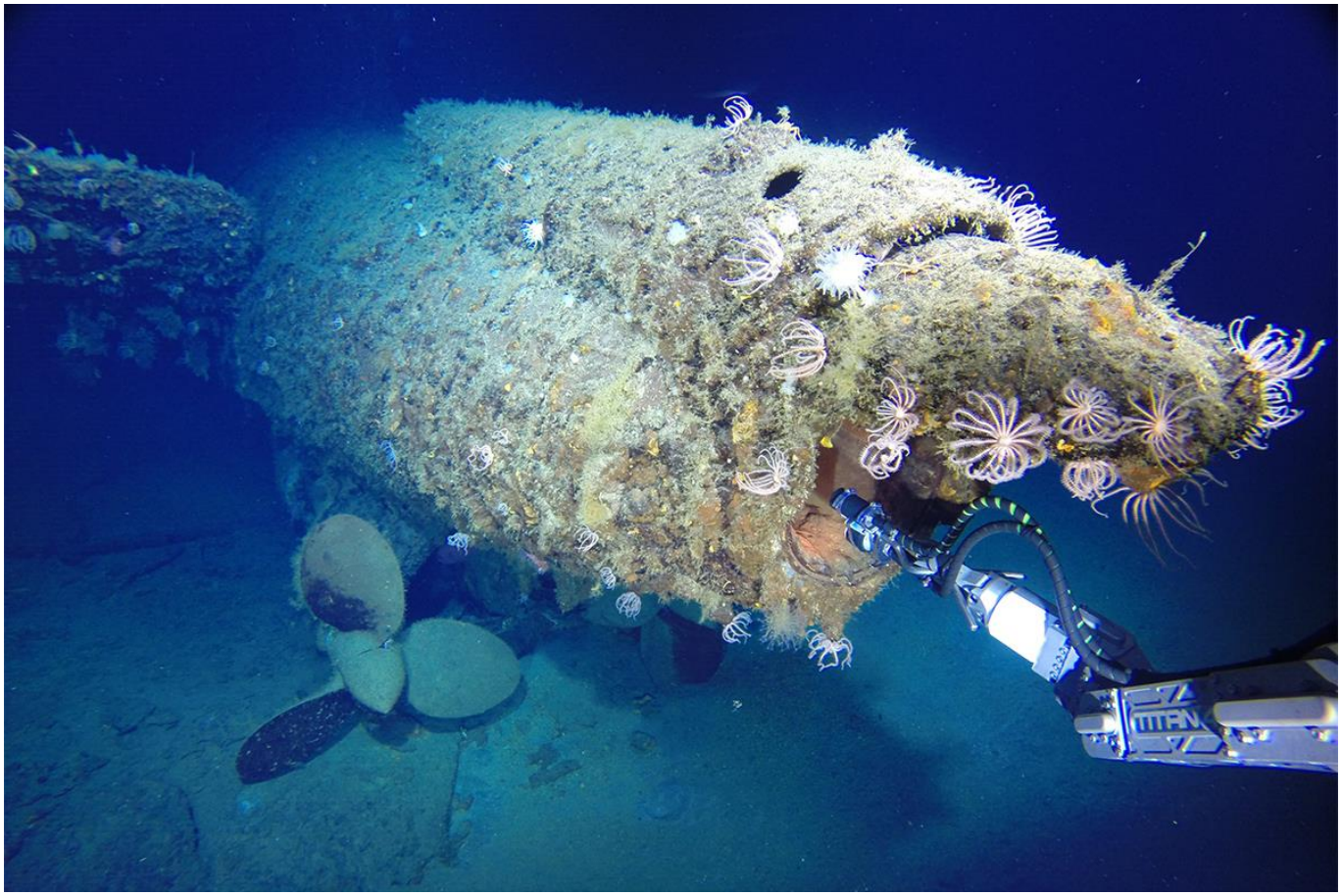
The inaugural dive also allowed *Petrel*'s crew to ensure the ROV was operating properly, and to check and colour-correct the video camera array. At the end of the first dive, the photogrammetric still camera was installed on the ROV's pan-and-tilt mechanism. It was one of the backup still cameras used to document the *Sydney* and *Kormoran* shipwrecks, and chosen because it was relatively simple to install and operate—a necessity due to the limited timeframe within which the project was organised and undertaken. During the *AE1* survey, it was pre-programmed to capture 12-megapixel resolution images every five seconds.

A total of 8,367 images and approximately 25 hours of full high-definition video were collected during the expedition.

Once on site, the ROV ran multiple longitudinal transects along *AE1*'s hull at a relatively slow (approximately 0.10-knot) pace to allow for required image overlap. Close-order survey was conducted around complex hull features, such as *AE1*'s fin. During a handful of transects, particular emphasis was placed on capturing images along the submarine's lower hull at the interface where it meets the seabed. This was done for the explicit purpose of acquiring greater detail in these areas, and contributing to the accuracy and completeness of the overall 3D model.

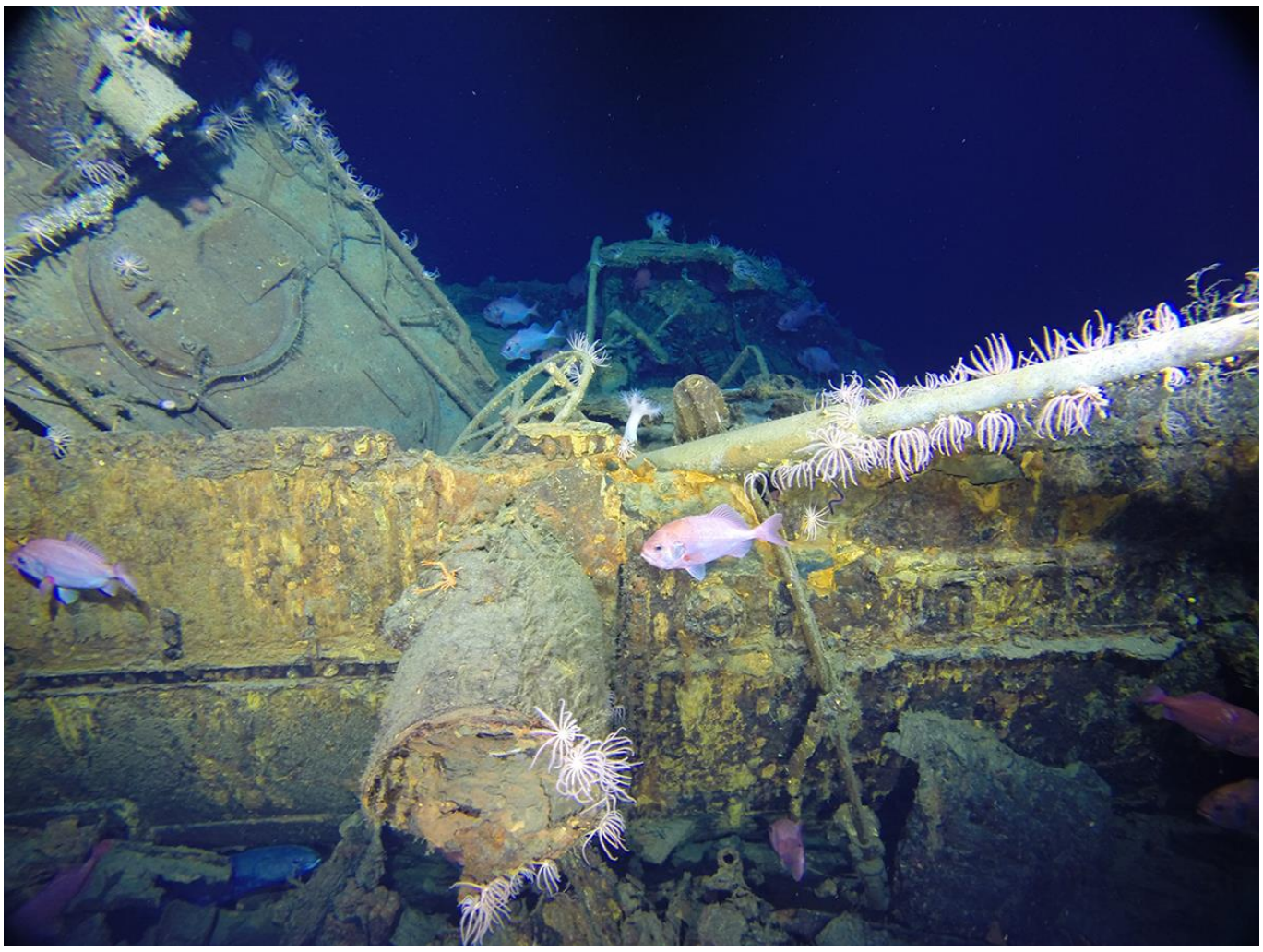
Port side view of the interim 3D photogrammetric model of AE1. A high-resolution 3D model is currently being generated from the more than 8,000 still images at Curtin University's HIVE (Hub for Immersive Visualisation and eResearch

In an effort to document the fragmented remnants of *AE1*'s side-mounted 'saddle' ballast tanks (which now lay in linear piles immediately beneath both sides of the hull), a 'zig-zag' pattern was adopted whereby the ROV would approach the hull, then pull away to thoroughly document the extent of the adjacent debris. At the team's request, a Standard-Definition camera was attached to one of the ROV's manipulator arms and used to image and closely inspect specific areas of interest, such as the submarine's open bow and stern torpedo tube caps, the face of the bridge telegraph, and small openings in the pressure hull that could not be adequately imaged with the regular ROV camera array.



A Remotely-Operated Vehicle (ROV) deployed from the research vessel Petrel uses a camera mounted on its manipulator arm to inspect the interior of AE1's stern torpedo tube

Once the second ROV dive concluded and image data became available, data processing commenced aboard *Petrel* to confirm the camera and modelling software were working properly, and generate test models of specific site features. These interim models were in turn employed to find gaps in the image data, and guide subsequent imaging strategy and ROV operations. By the end of the survey, interim low-resolution models had been generated for *AE1*'s stern and bow sections, starboard ballast tanks, and fin. A total of 8,367 images and approximately 25 hours of full high-definition video were collected during the expedition.



Forward periscope on the Hull

Survey results

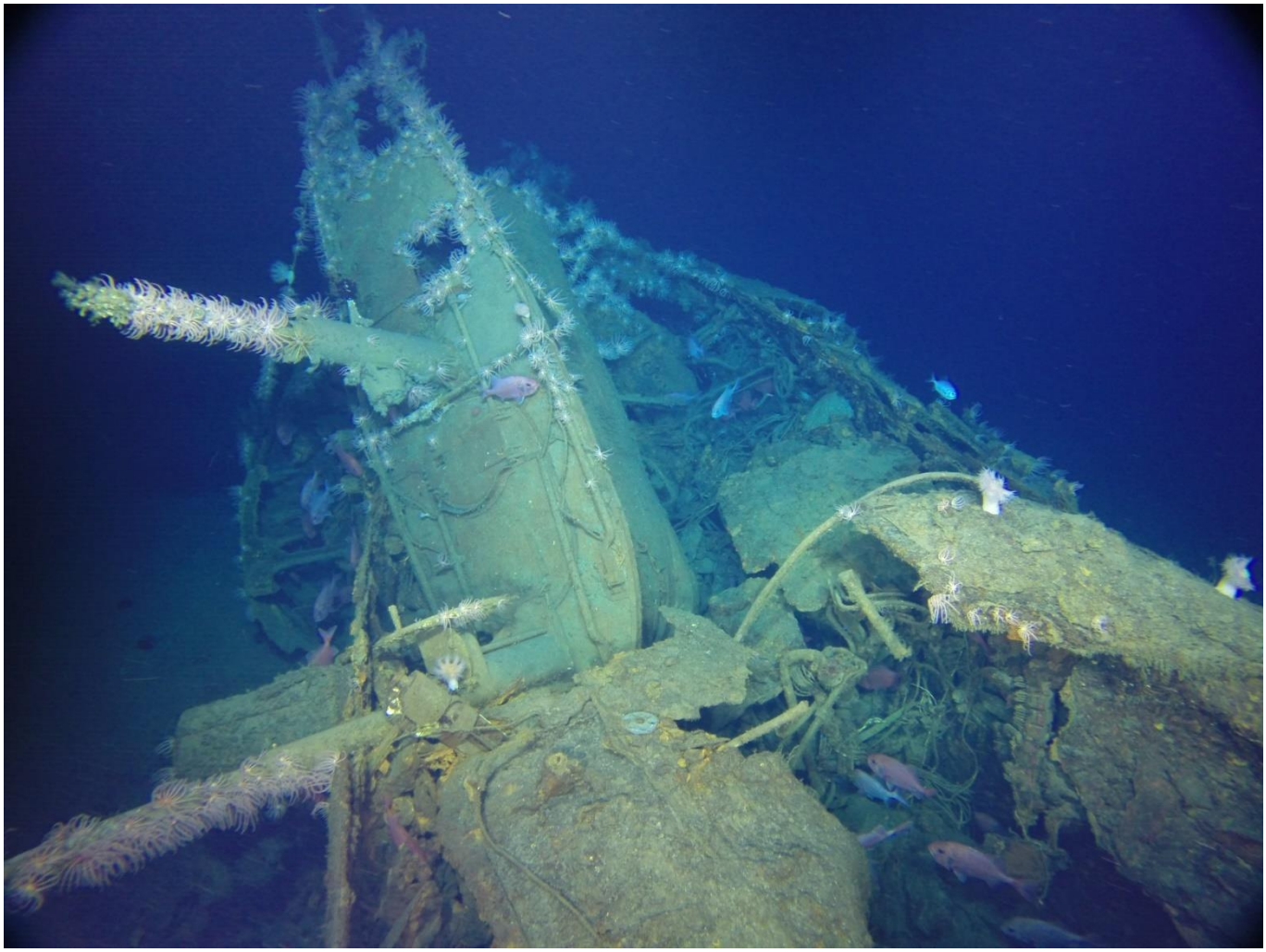
The ROV examination of *AE1* confirmed some preliminary observations made during the December 2017 expedition, but also offered a number of new revelations. Detailed still and video imagery, and the generation of a comprehensive 3D photogrammetric model of the submarine, has also resulted in refinement of some conclusions made in 2017.

AE1 is resting upright on a largely flat, featureless sand/silt seabed and is almost completely exposed, with only the keel and the tip of a blade from each propeller buried in the surrounding silt. While the approximate aft half of the submarine is largely intact, hull sections forward of the fin have collapsed inwards as a consequence of a catastrophic implosion event. Specific activity areas within *AE1* devastated by implosion damage include the control room and forward torpedo compartment. Structural failure of the forward pressure hull has resulted in the fin collapsing and toppling forward into the remnants of the control room.

Damage to AE1's forward pressure hull from implosion is clearly evident in the ROV footage, still imagery, and 3D model.

Damage to *AE1*'s forward pressure hull from implosion is clearly evident in the 2018 ROV footage, still imagery, and 3D model. Sections of hull plating have been folded over and

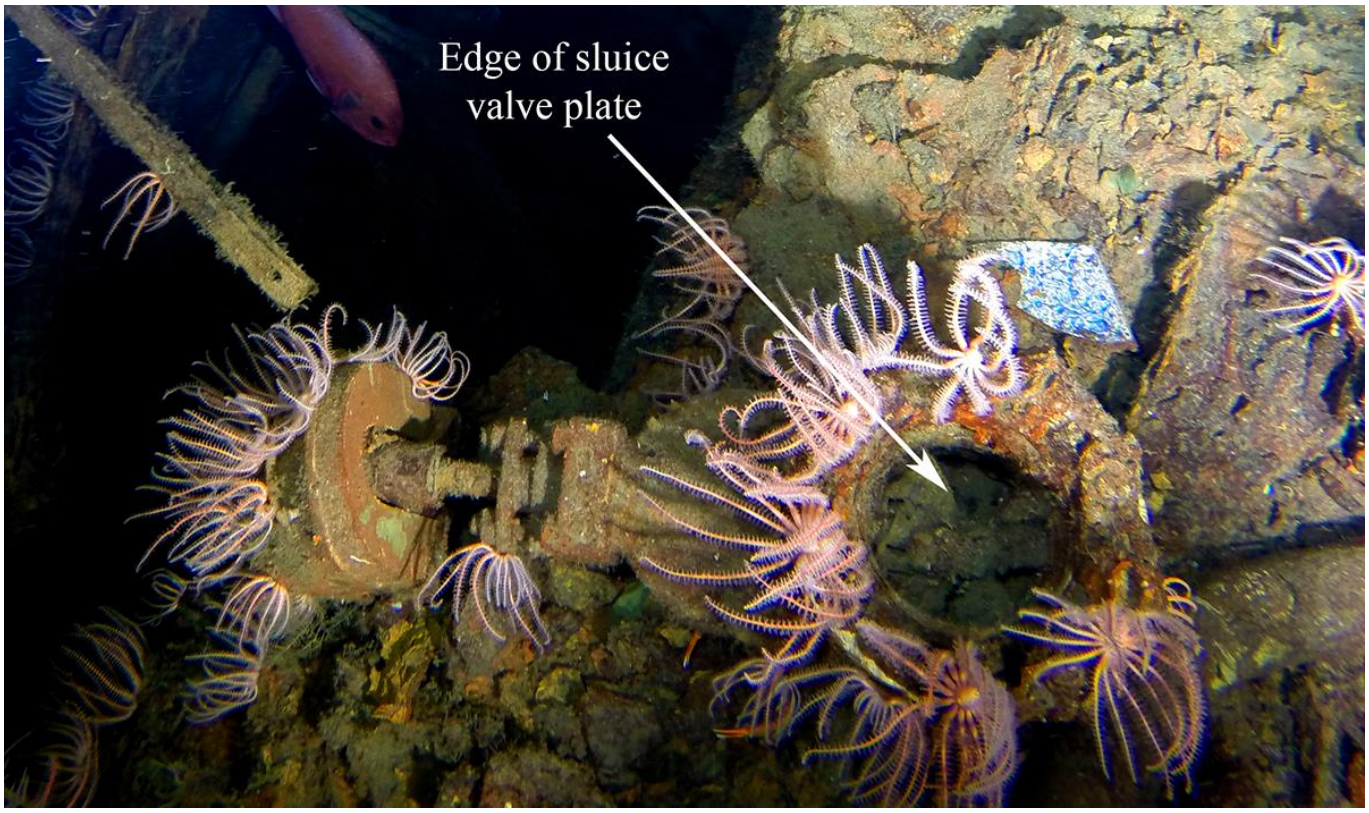
collapsed, and the pressure hull completely opened from the forward torpedo room to the control room. Two copper-alloy hand wheels in the forward torpedo compartment have been bent and warped in a shallow 'U' shape—attesting to the power of the violent inrush of water as the pressure hull failed. Either as a consequence of the implosion or *AE1* striking the seabed (or both), the hull plating at Frame 70 has failed and effectively broken the submarine's back. This damage is evident in individual images, but the extent of the hull's failure is best captured by the 3D photogrammetric model, which shows the forward section misaligned and collapsing downwards relative to the rest of the hull.



Implosion of AE1's forward hull has caused the fin to collapse into the remains of the submarine's Control Room

AE1's aft torpedo tube cap was observed in the fully open position—the necessary first step to launch a torpedo. However, the torpedo is protected from sea pressure by a sluice valve, which is shut. This indicates the tube was not fully prepared for firing. The procedure to open the stern cap was via a manually-operated hand-wheel, and the effort necessary to perform this function clearly indicates it was done intentionally. The reason why the cap is open remains unclear; it may have been opened as part of a training exercise, but could also have been a preparatory step to increase the speed with which a torpedo could be launched if *AE1* came under attack. The cap for the forward torpedo tube is slightly ajar, but not in the fully open position. The worm gear used to open the forward cap does not appear to be damaged, which suggests it was either partially open—or in the process of being intentionally

opened or closed—when the loss of *AE1* occurred. The doors for both amidships torpedo tubes—which were positioned athwartships across *AE1*'s central pressure hull and ballast tanks—are in the closed position.



AE1's open ventilation valve; arrow indicates the edge of the valve's sluice plate

The upper conning tower hatch is closed, and close inspection of the upper helm revealed it is manufactured from copper-alloy and affixed to the periscope standard with a large copper-alloy nut (presumably attached to a threaded bolt). The upper helm also has a copper-alloy steering handle attached to it. Images of the helm within the conning tower revealed that it too is manufactured from copper-alloy but affixed differently—either by a copper-alloy bolt that has been peened over the hub of the wheel, or one that is held on with a nut (or some other means) within or on the other side of the periscope standard. Unlike the upper helm, it does not have a steering handle.

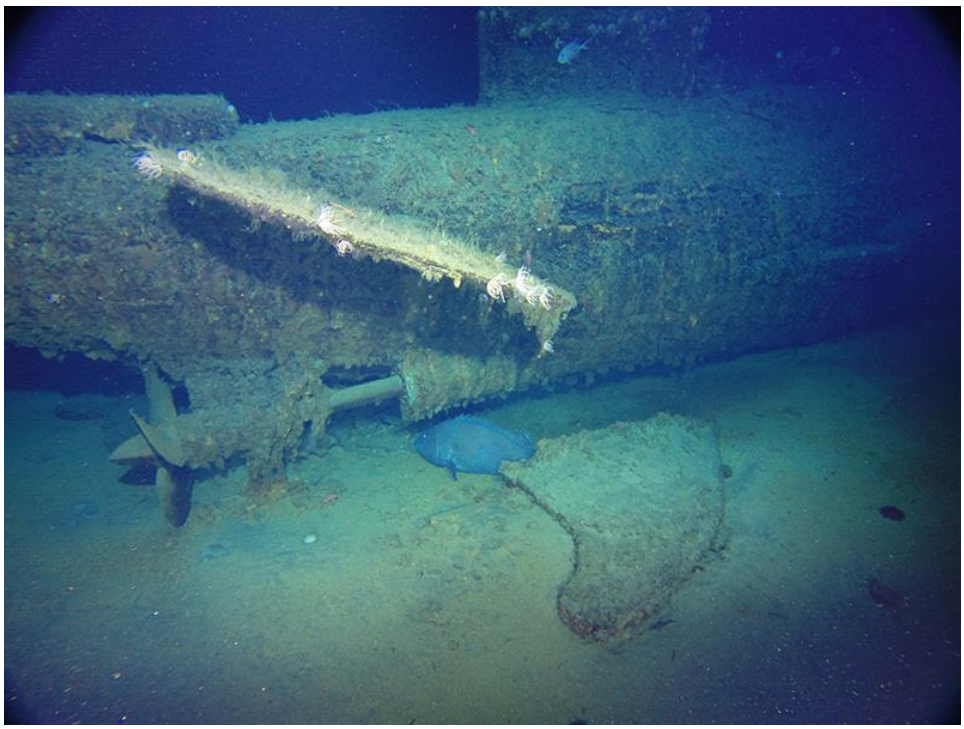
Close inspection of the submarine's ventilation valve—which was positioned in the after section of the fin, and is currently exposed as a consequence of the fin toppling forward and dislodging the valve's associated ventilation trunking—revealed that the edge of its sluice plate is positioned across the valve so that it was approximately 60-percent open. Given that the ventilation valve was not completely shut, it would have served as a point of ingress for water while the submarine was submerged, and likely was the primary contributing factor to its loss.

Natural forces such as corrosion have caused most of AE1 'saddle' ballast tanks to disintegrate and collapse to the seabed. The opening for the submarine's port side amidships torpedo tube is visible at image far right

While still largely intact, the submarine's hull has been detrimentally affected by differential corrosion of its various metallic components. This is perhaps most evident in the destruction of most of *AE1*'s saddle ballast tanks, which were constructed of lighter-grade steel than the pressure hull and appear to have preferentially corroded, fragmented and collapsed to the seabed. Other disarticulated hull elements observed during the survey include *AE1*'s hydroplane guards, rudder and skeg. All four guards are lying flat on the seabed, just beneath their respective hydroplanes. While natural processes such as corrosion could have caused them to fall away from the hull, a more likely explanation is that they snapped off as *AE1* fell onto its keel after initially striking the seabed stern first and pitching forward. As regards the hydroplanes themselves, the 2018 survey confirmed that both fore and aft sets were in the 'hard-to-rise' position, which indicates the crew desperately attempted to recover from a dive and return to the surface. *AE1*'s rudder and skeg were found lying beneath the port side propeller. Both appear to have been broken off by the submarine striking the seabed stern first; however, the angle of the impact was shallow enough that it did not damage *AE1*'s propellers.

AE1's disarticulated skeg and rudder lay on the seabed beneath the submarine's port propeller. Image: Paul G. Allen, Find AE1 Ltd., ANMM and Curtin University

It is worth noting that deterioration and disarticulation of specific hull components may also have been facilitated by tectonic activity around New Britain and the Duke of York Islands. The fin, for example, has collapsed further into the control room since *AE1*'s discovery in December 2017 (and in the wake of large earthquakes and accompanying aftershocks in New Britain in March 2018). While there is clear damage to the submarine from natural processes, no evidence of human-manifested change (such as anchor or trawl damage) was noted. Indeed, unlike many historic shipwreck sites in shallow water and/or more developed areas, *AE1* appears to be relatively free of modern rubbish and debris.



The starboard propeller, after hydroplane guard and resident grouper

Conclusion

The 2018 ROV examination and photogrammetric survey of *AE1* proved immensely successful. In addition to acquiring detailed still and video imagery, the effort has already resulted in production of an interim 3D digital model of the entire shipwreck site. This in turn has facilitated archaeological examination of *AE1* on a macro scale, and led to the identification of large-scale features—such as the slump in the submarine's hull that has resulted from the break near Frame 70—that otherwise may have gone unnoticed. A significantly more detailed high-resolution photogrammetric model of *AE1* is currently being generated at the Curtin HIVE, and is expected to offer even greater opportunities for analysis, interpretation and—eventually—exhibition.

Lessons learned during the 2015 photogrammetric survey of *Sydney* and *Kormoran* were put to good use during the *AE1* expedition, with the result that the latter shipwreck received effective, comprehensive photographic coverage in a short span of time. The survey also revealed—through the use of only one uncomplicated and inexpensive camera for photogrammetric capture—that much can be accomplished with relatively little.

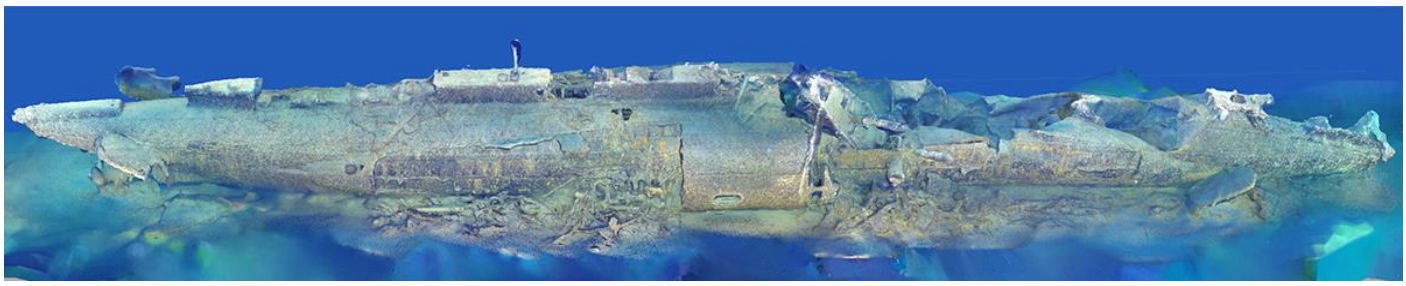
Imagery and data collected during the survey has also refined and contributed to an understanding of the sequence of events that led to AE1's loss.

Imagery and data collected during the survey has also refined and contributed to an understanding of the sequence of events that led to *AE1*'s loss. For example, the submarine's bow and stern torpedo tube caps were found to be either partially or fully open, and that this appears to have been an intentional act carried out on the surface.

Why the caps were open, and whether they contributed in some manner to the loss will likely never be known.

Similarly, the reason that the ventilation valve was partially open will probably never be solved, but it is fair to say that it was one of the root causes of the submarine's demise once it began to submerge on what would be its last dive. Despite efforts by the crew to recover—as evidenced by the positions of the hydroplanes—*AE1* was overwhelmed by the inflow of water through the ventilation valve and began to sink by the stern.

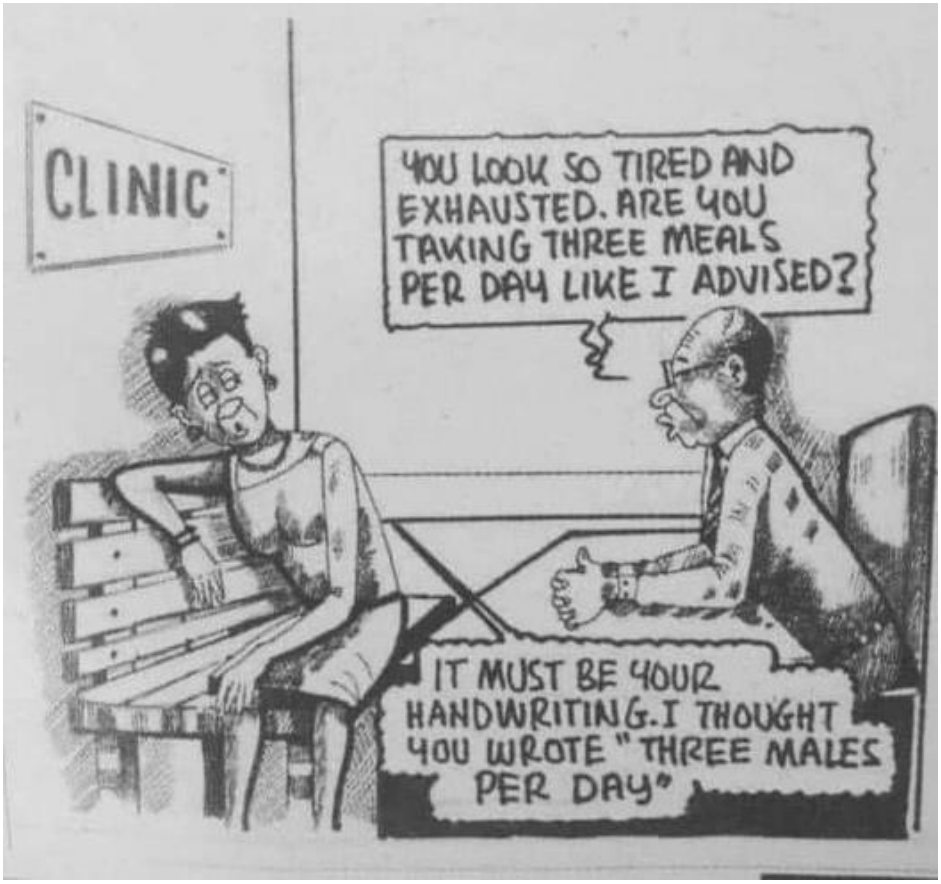
At an unknown depth, the forward pressure hull partially imploded, killing the crew instantly.
At an unknown depth, the forward pressure hull partially imploded, killing the crew instantly.
The submarine continued its fatal dive until it struck the seabed stern first at a shallow angle, breaking off the skeg and rudder. The hull then pitched forward, breaking *AE1*'s back and possibly snapping off all four hydroplane guards. This violent movement also affected the fin, which—likely already weakened structurally during the implosion—began to topple forward into the control room.



Interim full HMAS AE1 model, viewed from the starboard side

Going forward, the imagery and 3D model generated as a result of the 2018 investigations will prove critical in *AE1*'s ongoing interpretation, exhibition and management. Among other things, the survey revealed that the shipwreck site is in a state of rapid natural decline, as differential corrosion—and contributing factors such as local seismic activity—takes its toll on the submarine's constituent parts.

The interim photogrammetric 3D model already generated now serves as an accurate representation of *AE1*'s state of preservation when discovered, and can be the benchmark by which future surveys of the site may be compared. It can also serve as the foundation upon which a variety of innovative interpretive and exhibition outcomes may be explored and developed to share *AE1*'s story for years to come.



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