



DESTINY OF

# AE2

AN AUSTRALIAN SUBMARINE  
IN THE SEA OF MARMARA, TÜRKİYE

EDITORS: BAYRAM ÖZTÜRK & KEREM ÜNAL



Publication No: 80



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The location of the AE2 submarine wreck, lying at a depth of approximately 72 meters, 4 miles north by north of Karaburun / Karabiga, as discovered by Selçuk Kolay.

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## FOREWORD

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**H. Oğuz Aydemir**

Chairman of the Board

TINA The Turkish Foundation for Underwater Archaeology

**D**uring the First World War, which took place between 1914 and 1918, Australian and New Zealand forces—known as the Anzacs—landed on the Gallipoli Peninsula as part of the Gallipoli Campaign, alongside British Commonwealth forces. Winston Churchill, the First Lord of the Admiralty at the time and one of the campaign’s political advocates, supported the decision to delay the withdrawal, despite the failures of the land forces, following the passage of the Australian submarine *AE2* into the Sea of Marmara. Some historians argue that this development led to the prolongation of the campaign and resulted in heavy casualties.

The Ottoman Navy’s *Sultanbisar* torpedo boat detected the *AE2* submarine and launched an attack, causing the submarine to sustain heavy damage. Consequently, the submarine was scuttled by its crew; however, the entire crew was taken prisoner. The confrontation between Australian forces and the Ottoman Empire on the Gallipoli Front has given this event a special place in Australian history, and the subject continues to be discussed with interest in the country to this day.

On 11 November 2000, at a reception organised by the Australian Defence Force in Sydney, Mr Selçuk Kolay, who discovered the *AE2* submarine wreck following extensive research and who had served on the Board of the TINA Foundation, was in attendance as a guest. I also had the honour of attending this event alongside him. Mr Kolay, who was awarded an honorary medal for his contributions to Australian maritime history, generated great excitement in Australia and became a significant source of prestige both for himself and for Türkiye. He did not limit himself to this discovery alone, but also made important contributions to joint efforts aimed at the preservation of the submarine wreck.

The TINA Foundation has shown interest in and supported the project at every stage. It also made representations to the Ministry of Culture, and the then Minister of Culture, Mr İstemihan Talay, personally contributed by chairing the workshop organised on the *AE2* submarine. Furthermore, I had the opportunity to meet Fred and Elizabeth Brenchley, the authors of “Stoker’s Submarine”, in Canberra, the capital of Australia, and secured the publishing rights for the book in Türkiye. We subsequently published it in Turkish with Mr Selçuk Kolay.

Years later, as part of another event, we at TINA The Turkish Foundation for Underwater Archaeology are delighted to have published the volume you hold in your hands, “Destiny of AE2: An Australian Submarine in the Sea of Marmara, Türkiye”, in collaboration with my dear professor Mr Bayram Öztürk and the Turkish Marine Research Foundation (TUDAV) that he represents.

Izmir, March 2026

## PREFACE

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**Bayram Öztürk**

Head of the Turkish Marine Research Foundation

**S**tudying underwater cultural heritage and the shipwrecks of the Gallipoli Campaign is an important issue for TUDAV and one of the prioritized research topics for the coming years.

More specifically, *AE2*, lying in the depths of the Sea of Marmara, has always been on the radar of the underwater experts of TUDAV. Constituting underwater cultural heritage of unique importance for both Türkiye and Australia, the destiny of *AE2* is noteworthy. *AE2*, once a symbol of the war and of difficult times for the Turkish nation, became an eminent example of peace and cooperation between nations, especially in these days when nations need more than ever the spirit of peace and the conscience of humanity.

The present book sets sail with the ultimate goal of strengthening human bonds. As a cruel reality, wars are made of blood, tears, and steel. Yet it is the same interaction between humans and steel that makes peace possible. The history of humanity is full of both examples. *AE2*, as a wreck made of steel and more than 100 years old, is one of the few shipwrecks that have managed to preserve themselves in the depths of Karabiga in the Sea of Marmara.

When mentioning gratitude, one should never forget the hero of the Gallipoli Campaign and the founder of the modern Republic of Türkiye, Mustafa Kemal Atatürk, a master of both war and peace, who described war as a murder unless a nation's life faces peril.

The present book on the destiny of *AE2* stands as a good example of learning from the lessons of humanity. It reflects the spirit of cooperation between the Turkish and Australian nations.

This book encompasses several chapters from different disciplines. These include the discovery of the wreck, the various aspects of diving expeditions to *AE2*, the technical characteristics of *AE2*, the story of *Sultanhisar* and *AE2*, and their brave captains Ali Rıza and Henry Stoker, the oceanographic conditions of the Çanakkale Strait, the protection measures related to the *AE2* wreck, and the legal status of the *AE2* submarine wreck under international law. We believe that all these chapters will fill the gap in terms of better decisions for the destiny of the *AE2* wreck.

As TUDAV, we would like to thank all the authors who contributed to this book by writing a chapter. We hope that this book will contribute to awareness of the *AE2* wreck, an underwater cultural heritage, and to peace between nations.

I am pleased to present this publication to the scientific community and all stakeholders who are interested in the Gallipoli Campaign, the war heritage of different countries, and its preservation.

Istanbul, March 2026

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IN THE SEA OF MARMARA, TÜRKİYE





“Running Amok in the Narrows”, a painting of AE2 passing through the Dardanelles, by Australian artist Phil Belbin (courtesy of Peter Briggs).

# THE DISCOVERY AND THE FUTURE OF AE2'S WRECK

SELÇUK KOLAY  
skolay@superonline.com

## ABSTRACT

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This article recounts the decades-long quest to locate and dive the wreck of the Royal Australian Navy submarine *AE2*, whose daring 1915 penetration of the Dardanelles marked a pivotal yet often overlooked chapter of the Gallipoli Campaign. Beginning with early research on steam-era shipwrecks in Türkiye and an initial encounter with WWI submarines through the identification of *UB 46*, the author's curiosity gradually turned towards the fate of *AE2*—Australia's pioneering E-Class submarine commanded by Henry Stoker. After describing *AE2*'s journey from Australia to the Sea of Marmara, its brief operations there, and its dramatic disabling and scuttling under fire from the Ottoman torpedo boat *Sultanhisar*, the narrative follows the author's meticulous, multi-year search across conflicting historical positions. Combining archival research in four countries, field interviews with local fishermen, and extensive side-scan sonar and magnetometer surveys over more than 100 square miles, the search culminated in June 1998, when the submarine's unmistakable silhouette appeared on sonar at a depth of 72 meters—upright, intact, and frozen since its sinking on 30 April 1915.

The article also reflects on the future of *AE2*, arguing that long-term preservation requires raising the wreck and placing it in a purpose-built freshwater conservation pool at Kilye Bay, the site of its most perilous moments in 1915. A joint Australian-Turkish project would create a unique WWI submarine exhibit and a symbol of peace, remembrance, and cooperation—an outcome that, the author suggests, Stoker and his crew would have wholeheartedly approved.

## Keywords

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HMAS *AE2*, Henry Stoker, Gallipoli Campaign, Discovery of the *AE2*'s Wreck

**E**very time I visited Australia, which was four times the case up to now, the long flight to Sydney and back made it very clear to me what a task it was for Captain Stoker and his crew to bring their submarine all the way from Australia to Türkiye, into the Sea of Marmara back in 1915.

Since 1976 I have been making researches on the ships, lost during the steam age, but my first encounter with submarines from this period came when I was asked by the Headquarters of the Turkish Navy to identify the remains of an unknown submarine, found on the Black Sea coast, near Istanbul, in 1993. After some research, I identified the wreck as the German submarine *UB 46*, lost in December 1916 with all hands. With my assistance the wreck was recovered, restored and put on display at the Naval Museum in Istanbul and later was transferred to the Naval Museum in Dardanelles (Çanakkale). This work reminded me of another submarine lost in Turkish waters at almost the same time and of my first encounter with the *AE2*.

In the mid-80's I was assisting the German researcher Bernd Langensiepen in gathering data for the completion of his book "The Ottoman Steam Navy". That was where I had studied the story of the fight between the *AE2* and the Ottoman torpedo boat *Sultanhisar*. I was now quite interested in looking into this case in detail, but decided to postpone the project for a while.

For November 1993 I had already planned another activity: the search for the lost WW1 Ottoman cruiser *Midilli* (ex-*Breslau*). Shortly after this successful operation, in December 1993 I produced a video documentary for public viewing. A year later, I conducted a search for the lost Turkish submarine *Atılay* which was suspected of having hit a mine in the Aegean Sea in 1942. Discovery of the submarine confirmed this belief, and again, I produced a documentary based on the video footage gathered throughout the diving operation which I led. The same year, together with Max de Rham and Tosun Sezen, I located the buried wreck of the Russian Admiral's ship *Yvestafy* from the Ottoman-Russian Çeşme War of 1770.

Ten years later, in December 1994, at a reception, I was approached by the Australian Ambassador to Türkiye, Mr David Evans, who was aware of my recent researches. He asked me whether I would be interested in conducting a search for the *AE2*. Being aware of the historical significance of the *AE2* for both nations I decided to take up the project.

*AE2* was one of Australia's first two submarines. It was acquired from England on 24 May 1914, to provide more autonomy in the protection of Australia's shores. These were the latest E-Class submarines called *AE1* and *AE2* and were the biggest, fastest and most capable submarines in the world. Built by Vickers in England, they displaced 655 tons on the surface and 796 tons submerged. They were 54 meters long and 6.5 meters wide. Having four 18-inch torpedo tubes (one bow, two beam, one stern), they would produce 1,750 h.p. from two eight-cylinder diesel engines, generating 15 knots on the surface and 9 knots submerged.



AE2 at Sydney Harbour.

The Commanding Officer of the *AE2* was Lieutenant Henry Hugh Gordon Dacre Stoker, a cheerful and flamboyant Irishman and a relative of Bram Stoker, the author of “*Dracula*”. By his own admission, he joined the submarine service for two reasons: It offered an extra 6s a day and he loved to play polo. He had heard of a rich Australian living in Sydney who paid people to play polo with him, so he offered himself for transfer and the command of one of Australia’s new submarines.

Officers of the *AE2*  
(left to right) Lieutenant  
Geoffrey Haggard,  
Lieutenant Commander  
Henry Stoker and  
Lieutenant John Pitt Cary  
as Prisoners of War in  
Türkiye (1915).



What was not known at the time was that Great Britain would declare war on Germany only three months later and the *AE1* would be lost with all hands at the very beginning of the war in Bismarck Archipelago. The exact location and the cause of the sinking was not known until recent years when the wreck was located near Ra-baul at 300 meters of depth in 2017.

Its sister ship, the *AE2* was ordered to join the Dardanelles Campaign and had to take a long trip all the way to Türkiye. It was a daring feat to reach Turkish waters for penetrating the treacherous and heavily-mined Dardanelles Strait.

A couple of months earlier, during their final meeting before General Sir Ian Hamilton was dispatched to take command of the Allied expeditionary force that was ultimately to try and capture the Gallipoli Peninsula and open the way for a Franco-British fleet to subdue the Ottoman capital of Istanbul, Field Marshal Lord Kitchener made a disparaging comment on the state of morale of the troops Hamilton's men would face.

“Suppose one submarine pops up opposite the town of Gallipoli and waves a Union Jack three times, the whole Turkish garrison on the peninsula will take to their heels and make a beeline for Bulair (Bolayır)”, Britain's Secretary of State for War told Hamilton.

Following their victory in the campaign, the Turks coined a phrase still used then referring to the deeds of 1914–16; “The Dardanelles were not passed”.

In hindsight, both were wrong. On the morning of 26 April, having successfully navigated the Straits the day before, the captain of the Royal Australian Navy's submarine *AE2*, Lieutenant Commander Henry Stoker RN, ordered the British ensign raised from the wireless mast of the vessel as it entered Türkiye's inland Sea of Marmara. Contrary to Kitchener's overconfident prediction, the Ottoman Fifth Army didn't “take to their heels”, instead holding their ground and fighting every Allied offensive to a standstill.

However, the reverse of the medal was that the Dardanelles were passed, with the *AE2* merely being the first of eight Allied submarines to break through into the Marmara. Though less well remembered than the land battles on the peninsula, submarines played a major role in the campaign, with Allied boats managing to pass through the Dardanelles on at least 14 occasions, with some British subs even attacking Turkish shipping in the Bosphorus, the first time enemy warships had entered Istanbul since its capture in 1453.

The Allied subs had to brave a series of natural and manmade obstacles in their fight to enter the Marmara, swift and swirling currents, mines and heavy nets strung across the Strait to ensnare them. During the campaign more than half those that attempted the passage were lost.

Türkiye's ally Germany also had submarines active in the campaign, with one boat, the *U21*, accounting for two British battleships, the *Majestic* and the *Triumph*, in a space of three days. Both sides inflicted heavy losses on their opponents, with

much of the Turkish mercantile fleet carrying supplies to the Ottoman army on the peninsula being sunk or damaged and a number of Allied troops ships and cargo vessels also being sent to the bottom with heavy loss of life.

*AE2* arrived in the enclosed Sea of Marmara on the morning of 25 April 1915; the same day Anzac troops were landing on Gallipoli beaches. *AE2*'s mission was to prevent transportation of Turkish troops and military equipment from Istanbul to the front in Gallipoli through the Sea of Marmara.

After four days in the enclosed sea, during which the *AE2* was successful in sinking one Turkish boat, Captain Stoker was happy to find out that the British submarine *E14* was also successful in penetrating the Dardanelles and getting into the Sea of Marmara. A rendezvous was arranged for the following morning, 5 nautical miles north of Karaburun. On his way to the rendezvous, he sighted the Ottoman torpedo boat *Sultanhisar* looking for the submarines. Trying to make an emergency dive, the *AE2* hit a denser halocline of water, causing it to rise uncontrollably.

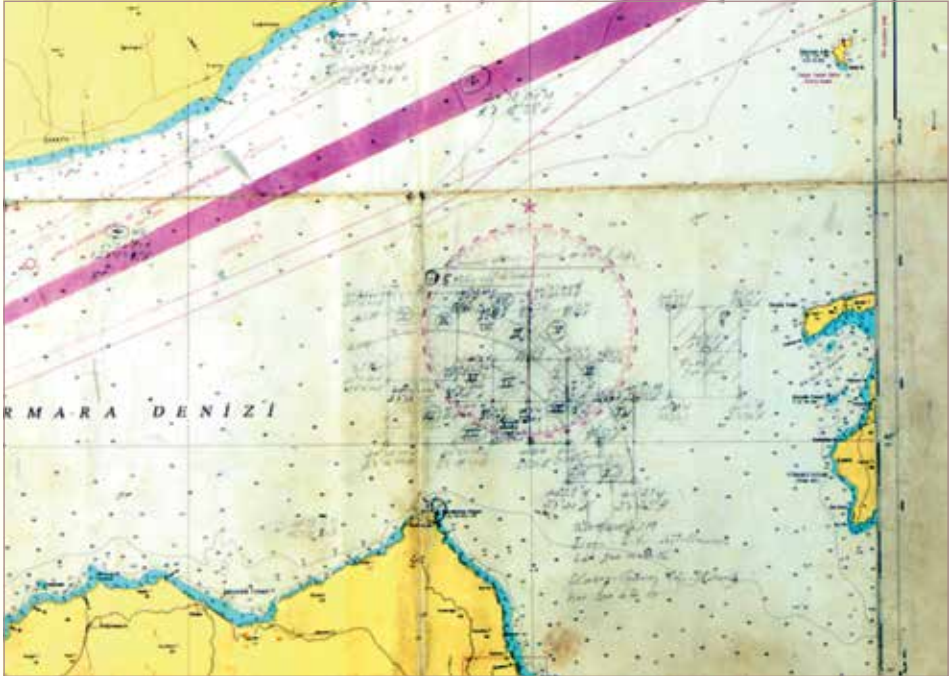
The Sea of Marmara has different layers of salt water with different densities (haloclines) which give a submarine unexpected buoyancy while diving certain depths and this phenomenon was experienced first time in history by Henry Stoker—the commander of the *AE2*.

Breaking surface with the stern first, the submarine was disabled by shell fire from the torpedo boat. Captain Stoker successfully gained some distance and scuttled his vessel, to make sure that it would not fall into enemy hands. All 32 of the crew were taken prisoner to stay in Afyonkarahisar, Türkiye until the end of WWI.



The Crew of HMA Submarine *AE2*.  
(Australian War Memorial Negative Number PO0371.001)

It has taken me three and a half years of intensive search to locate and dive the wreck of the *AE2*. I started with the archive studies in early 1995. Materials I gathered from Turkish, Australian, British and German archives revealed to my surprise four different locations, with quite a big dispersion.



Map with possible sinking sites marked and used during search operation.

---

I worked out a search pattern covering all possible positions and giving me an area of approximately 140 square miles to scan!

Since this part of the Sea of Marmara is quite flat on the bottom, covered with a thick layer of soft mud, I decided to use a combined system of side-scan sonar and proton magnetometer for the search operation. This system would enable me to detect the submarine even if it was totally buried by the mud after 80 years. I knew that the Turkish Navy and some other researchers had tried to locate the *AE2* in approximately the same area in the past, but I wanted to be sure of its absence in the scanned area by using this combined system.

Supported by global positioning system, I started scanning the quadrants one by one, beginning from the east. I was pulling the lines from east to west or from south to north, depending on the wind direction. This part of the Sea of Marmara can be very rough; it was March and my search was frequently interrupted by unfavourable weather conditions.

By June I had already eliminated about 80% of the area and was able to concentrate more on Stoker's position which was given as "4 nautical miles northeast of Karaburun Point". While I was carrying out the scanning, I visited the fishing villages in the vicinity during the evenings and talked to many trawler men in the hope that they might indicate locations where they were snagging their nets. But this revealed nothing definite.

By the end of August, I had scanned the whole area, including even a small part to the northwest of Karaburun, to no avail! All I had found was a sunken coaster and a natural magnetic anomaly picked up by the magnetometer, not too far away from Stoker's position. People involved in my search advised me to concentrate on the Turkish position rather than on Stoker's position since he was in enemy waters and was desperately trying to escape, so his statements about the position would not be accurate. I didn't share this opinion. For me, this man, bringing his sub all the way from Australia for almost 10,000 nautical miles through many seas and



Selçuk Kolay during AE2 search.

through the Dardanelles without touching a single mine, would know by inches where he sank! Yes, I still wanted to stick to Stoker's position, though the sub was definitely not there and I was quite confident of my survey. So, I decided to take a different path and started studying Captain Stoker's life after the sinking.

During his imprisonment in Afyon, in Türkiye, he had escaped twice from prison. On the second time he was caught at the Port of Izmir just before boarding a boat—disguised as a lady! Back in England after the war he had some problems with the Admiralty refusing to decorate him though he had succeeded in not letting the submarine fall into enemy hands. He left the Royal Navy shortly after the command of one of the new K-Class boats was given to him, and went to London where he worked as an actor until his death in 1970. Quite a remarkable man!

I had to find living relatives or descendants of his staff to get more information. Some help came from Andrew Solomon, a friend of mine working at the BBC Studios in Acton, London. He had found the only living relative, a niece of Captain Stoker: Miss Primrose Stoker, 80 years of age, living near Greenwich in London.



Selçuk Kolay with Primrose Stoker in London.

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In September I went to London and visited her. She was quite interested in what I was doing. After a couple of cups of coffee, she handed me an old leather bag full of manuscripts—the original bag Captain Stoker had taken with him before leaving the *AE2*! The contents consisted of his diaries, maps, his notes and letters he received during his imprisonment, including maps showing escape routes from the prison in Afyon to the Port of Izmir and his original copy of the report about the loss of the *AE2* that he had sent to the Admiralty! I was even allowed to take the documents away with me for study. Could I ask for more? I did! My question was: “Can you remember him telling anything about the story of the *AE2* after coming back from imprisonment?” Her answer was: “As a hero of war he never talked about this incident; he was too secretive! But as a little girl then, the only thing I can remember was his wife’s telling my mother that Captain Stoker would sometimes shout “North! North!” in his sleep.” With this he was probably referring subconsciously to the moments he was desperately trying to escape from the Turkish torpedo boat *Sultanhisar*...

During the next 48 hours I studied the handwritten documents with almost no sleep. Most of them were what I already had in my files in printed form. But here, I was able to read between the lines and spot everything he had corrected and changed. My attention was drawn to his statement about the sinking position where he said: “The boat sank at an approximate position 4 miles north of Karaburun Point at 55 fathoms of depth (102 meters) around 10.45 am.” This sort of depth is not in accordance with the depth at the given sinking location, which is about 70 meters.

Back in Türkiye I decided to concentrate on Stoker's position. He might have been wrong with the depth, but I had the feeling that he should be right with his position. Even a sketch made by the signalman John Thomson during his imprisonment clearly showed that the sinking location was somewhere northeast of Karaburun. But where was the *AE2*? I decided to scan the area again, more carefully. I knew, this was the hardest case I had ever had.

On various charts all the sinking points were shown somewhere around northeast by north of Karaburun. Though he had not given an exact position, the area indicated by the commander of *Sultanhisar*, Captain Ali Rıza, in his book "*How I sank the AE2*", published in 1947, was in accordance with Stoker's location.

According to him, after the disabled sub had surfaced and hoisted the white ensign he waited until the whole crew swam over to *Sultanhisar* and were taken on board. Then a boat was sent to pick up Captain Stoker from the sinking submarine. A couple of minutes after the *AE2* had disappeared from the surface and the whole crew of *AE2* was safely on board *Sultanhisar*, two other Ottoman torpedo boats, *Zuhaf* and *Aydın Reis*, had arrived to help and had taken the bearings at the sinking location. What was that position? So far I was not able to find it in the archives.

By January 1998 I had already finished my third year into the search. It was funny that every passing month I was becoming more determined than desperate. Almost 3 years ago, 6 months into the search, I had even scanned a small area to the northwest of Karaburun, though all the various given locations were slightly to the northeast of Karaburun.

On a very fine day in May I dropped a marker buoy exactly 4 miles north of Karaburun and told our research ship's captain to stop the engines and to stand by till I had finished working out a new search pattern on the charts. After circa a quarter of an hour, when I was finished with the job, I saw that we had drifted about half a mile to the west. There were no waves, no wind; dead calm—like on the day of *AE2*'s sinking. This was probably due to a weak natural current towards the Dardanelles. Suddenly I remembered the Turkish position approximately 8 miles west of that of Stoker, which I had classified as wrong and had not considered as a possible sinking site being too far west! I ordered the crew to haul up the buoy and move to the west for a few miles.

I knew that I had to scan further to the west; further than I had scanned before but not as much as the given Turkish position. The latitude of this Turkish position seemed to me to be right, but the longitude was surely too far west. Why? Before starting a new search, I decided to examine this position in further detail.

The position was taken from a book published by the Turkish General Staff in 1936, but no source was shown.

I was sure that it was taken from Ottoman naval archives and transcribed from Arabic writing into Latin after 1928, when Türkiye had switched from Arabic to the Latin alphabet. Since the Ottoman naval archives are still in the process of being transcribed and classified, I had to do my own detective work.



SULTANHISAR

5.1915 istinye

N155-29



*Handwritten text:*  
9 May 1915  
Sultanhisar - 5.1915  
Wreck of AE2

SULTANHISAR

5.1915

N155-29

Sultanhisar and the gunman who disabled the AE2.

I was sure that a mistake was made during the transcription.

When I studied the Arabic figures, I knew that a mistake was made during transcription: Figures 10 and 15 are almost identical, so the east longitude should read 15 minutes instead of 10 minutes which put the Turkish sinking position given in 1936 further east by 5 miles and almost two miles west of Stoker's position. I now had a new area of approximately 4 square miles to scan.

11 June 1998 was a very nice day. I started scanning early in the morning. At 17.10 in the afternoon, when I was thinking of finishing for that day, a slim profile started showing up on the screen of the side-scan sonar and a couple of seconds later the magnetometer went mad! I knew I had found the *AE2*, but I kept very calm, took the GPS readings and ordered to return to Port of Karabiga for the night and to prepare for an extended magnetic and acoustic survey of the site next day.

On 12 June, weather conditions were excellent again. I could finish the survey in less than 3 hours. The magnetometric survey had shown that the wreck was approximately 600 tons. From side-scan sonar images one could easily see the shape of a submarine with a length of 50–55 meters! *AE2* was lying at a depth of approximately 72 meters, 4 miles northwest by north of Karaburun.

A quick check on my old plotting revealed that 3 years ago, 5 months into the search, I was within 300 meters of this point, scanning from east to west!

Everything now became obvious. When the *AE2* was hit and damaged by shell fire from the Turkish torpedo boat, Captain Stoker had decided to scuttle it not to let it fall into enemy hands. He steadied his boat on the surface, gave the signal to *Sultanbisar* that he was ready to surrender and gathered his crew onto the deck. Then he probably took his bearings to know his exact position before opening the valves.

At that time, he was slightly at northeast of Karaburun as marked on the charts. It took some time before the last one of his crew and Captain Stoker reached the torpedo boat and the slowly-sinking submarine disappeared from the surface. During this time both the sub and the torpedo boat had drifted westwards, just as our research ship did 83 years later—and the two Turkish tor-



Side-scan sonar image of *AE2*.



Research vessel *MV Saros*.

pedo boats closing in just after the sinking, took the actual bearing of the sinking point.

This explains why the sinking site is different from the markings on the charts based on the position given by Captain Stoker. The quite-accurate Turkish position was later transcribed wrongly and seemed to be too far west to me!

Now, it was time to begin with preparations for the dive. A dive to 72 meters really needs very careful planning. Spending many hours at the computer we finalized the dive-plan and decided for the composition of gases to be used at various depths.



Pre-dive preparations.

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But *AE2* apparently still did not want to reveal its secrets. On our first dive, in the third week of June, the shot line came off the wreck when we had reached a depth of 60 meters and we had to abort the dive. On our second try we reached the bottom to see that the grapnel-hook was resting in mud with no trace of the wreck around.

On 2 July 1998 I used a sophisticated method to secure a shot line to the wreck and I started descending with Kaya Yazar, my buddy and with Levent Yüksel, the cameraman, following me. At 16.05 I was probably the first person to see and touch the *AE2* for 83 years!

The visibility was about 3 meters and I knew exactly where we were: Next to the starboard side exhaust pipe! We had a quick tour of the aft deck and the conning tower. The submarine was in excellent condition. It was like stepping back in time. The

morning of 30 April 1915 was frozen here. Before coming up I rubbed my gloves against the rusty hull; I wanted to keep these gloves with the rust from the *AE2* as a memory. Back on board *Saros*, our research ship, I dropped my diving gear on the deck and rushed to the bridge in my wetsuit and telephoned my Australian friends. It didn't matter that it was after midnight in Australia. Coming down from the bridge I was surprised to find out that one of our crew had washed my gloves saying that they looked rusty!

This exploratory dive revealed that the submarine is lying upright with mud almost up to the waterline in 72 meters of water. The hatch of the conning tower is partly open and there is a big conger eel on guard!

After my locating and diving the *AE2* in September 1998, a team of Australian divers led by Dr Mark Spencer came and verified the identity of the wreck.

Two years later, in May 2000 I was very honoured to receive The Medal of the Order of Australia for my efforts in locating the *AE2*.

In fact, *AE2* is the sub that shaped Gallipoli: With appalling casualties to Anzac troops, it soon became clear that the landing on the beaches of Gallipoli was a mistake. It is thought that the troops were to be recalled when the news of the *AE2*'s successful penetration of the Dardanelles Strait reached Sir Ian Hamilton. Instead of withdrawing, he wired the troops: "The Australian submarine has got up through the Narrows and torpedoed a Turkish warship at Chanak... Dig, dig, dig until you are safe!"— On both sides thousands of men ended up paying the ultimate sacrifice for their countries.



Selçuk Kolay during *AE2* dive.



*AE2*'s bow at 73 meters of depth.



The model of *AE2*'s wreck as found in 1998.



Selçuk Kolay with Dr Mark Spencer.



Selçuk Kolay with Tim Smith (one of the anode blocks on the background before being lowered to the wreck).



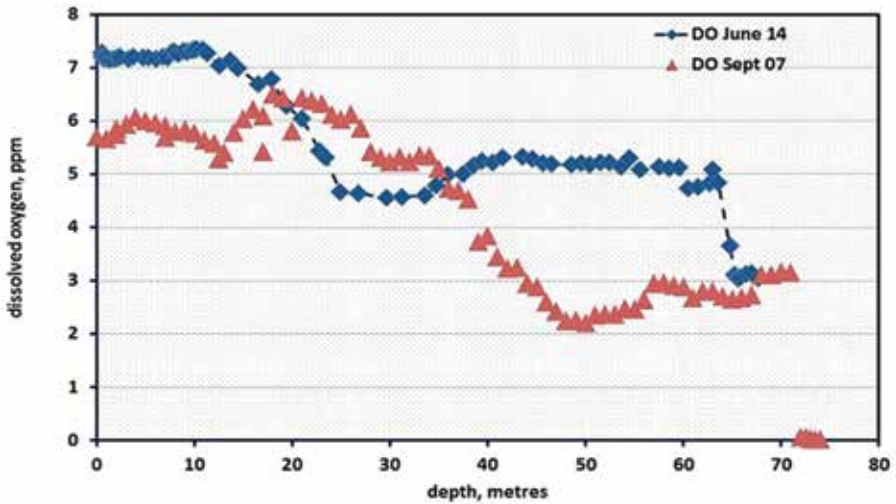
Dr Ian MacLeod during oxygen level measurements.

The future of the *AE2* should be seen in her raising, followed by proper restoration and conservation, rather than in the depths of the Sea of Marmara.

In 2007 and in 2014 Australian divers and experts organized by the *AE2 Commemorative Foundation's* "Silent Anzac Project" came for further assessment of the wreck when I had the pleasure of working with Admiral (ret.) Peter Briggs and archaeologist Tim Smith.

As a rule of thumb metal wrecks lose about 1 mm of the thickness of their hulls every 10 years. After implementing ultrasound testing we surprisingly found out that *AE2* had only lost 1 to 4 mm of her hull's thickness of 12 mm in 100 years! This is mainly due to the fact that dissolved oxygen level of the saltwater around the sub is quite low as the measurements we carried out with the renowned corrosion expert Dr Ian MacLeod has proven.

Additionally, three huge anode blocks each of them weighing 400 kilos were placed next to the wreck and connected to various points to prevent further corrosion. Additional measurements showed that the corrosion rate went back by 43 per cent already eight days later. The successful application of the anodes to the submarine is the major step in the long-term preservation of the wreck. A visual inspection of the interior was also realised by means of a drop camera which was sent through the half open hatch on the conning tower. The hatch was then sealed to prevent any possible illegal intrusion by divers. A marker buoy was also placed to prevent any snagging of trawler nets and is monitored by the coast guard.



Dissolved oxygen reading around the wreck.

However, to save the *AE2* for future generations the wreck must be raised and preserved. Otherwise not much will remain during the next hundred years.

Since *AE2* is not a war grave, my proposal will be raising her by means of a specially built lifting array connected to pontoons and transferring her into a specially built pool with fresh water on long term desalination and display at Kilye Bay near the Dardanelles where she had the most difficult moments of her passage back in April 1915. This will make her the only WWI submarine on display in the world with a great story behind.

Such a project should be realised in a joint venture with Australia which would create a dual attraction, with Gallipoli's Anzac Cove, for the growing numbers of Australians making a pilgrimage to Türkiye and should be seen



Marker Buoy.



A view from the wreck's interior.

as one which enhances the good will already existing between our two modern countries.

The *AE2*, once a symbol of war will then become a symbol of peace and cooperation.

I think, Captain Stoker and his crew would approve this!

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## JOINT TURKISH-AUSTRALIAN EXPEDITIONS OF 1997 AND 1998 TO CONFIRM DISCOVERY OF AE2

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### ABSTRACT

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This chapter offers a first-hand narrative of the joint Turkish-Australian expeditions of 1997 and 1998 that sought to verify and ultimately document the discovery of the Australian First World War submarine *AE2* in the Sea of Marmara. Written from the perspective of a recreational technical diver and expedition leader, it traces the convergence of advanced deep-diving technology, international cooperation, media attention, and maritime archaeology, from the initial misidentification of a wreck to the confirmed location and detailed photographic recording of *AE2* at 72 metres. Beyond recounting the technical, logistical, and political challenges of the expeditions, the chapter reflects on the emotional and historical significance of diving on a largely intact relic of the Gallipoli campaign, situating *AE2* not only as an object of naval heritage but as a powerful symbol of shared history, reconciliation, and enduring friendship between Türkiye and Australia.

### Keywords

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*AE2*, Diving, Expedition, Photography

## INTRODUCTION

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**H**ow did a dentist get involved with the WW1 Australian submarine *AE2*? As an enthusiastic ocean explorer, I loved the challenge of shipwreck photography, but this passion always had to be balanced with my dedication to the considerable demands of my profession of dentistry.

Around the middle of the 1990s, recreational wreck divers were adopting technology largely used by commercial and navy divers. This included the addition of helium in our breathing gas for safer diving beyond 60 metres and the ‘enrichment’ of air with oxygen for safer and more efficient decompression during ascent. Towards the end of the 1990s, ‘closed-circuit’ rebreathers were also increasingly used by deep wreck and cave explorers to minimise gas wastage associated with the use of ‘open-circuit’ SCUBA, where expired gas is lost into the water column. By 1996, my wreck-diving buddies and I were fully certified as deep-water ‘mixed-gas’ divers and started exploring new wrecks in depths greater than 60 metres.

On the morning of 5 July 1997, I read a small column on the front page of the Sydney Morning Herald (newspaper) of the alleged discovery of Australia’s *AE2* submarine (Australian E-Class number 2), by Turkish businessman and underwater explorer Selçuk Kolay. The wreck was sitting on the sea floor at a depth of 86 metres in the Sea of Marmara. Among my diving friends were professional and amateur maritime archaeologists, a model builder, video cameraman and a diving expert who had trained and certified us in deep ‘technical’ diving. This, I thought, would be the perfect opportunity to exercise our combined skills.

In my naivety I approached the public enquiries section of the Royal Australian Navy to volunteer our services. I was told—politely—that procedures to deal with this alleged discovery were underway, but “thank you for contacting us”. Fortunately, a political journalist patient of mine suggested I contact the then Federal Minister of Defence Industries, Science and Personnel—The Hon. Bronwyn Bishop. This dental client even organised a meeting with the minister for me, after which a ‘ministerial directive’ to the naval head office in Canberra ensured.

Commodore Michael (Mick) Dunne AM was assured of our competency and enabled some logistical and financial support to send my team to Türkiye. RAN support also included the setting up of a website in 1998 of “The Discovery of *AE2*” (National Library of Australia). I could post daily reports of our activities in Türkiye, along with some digital photos with Nikon’s first consumer digital camera, lent to me for the trip. This Federal Government imprimatur (along with some lobbying of defence contractors by Minister Bishop) made it easier to procure additional financial or logistic support from other sponsors,<sup>1</sup> including a major televi-

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1 Australian Women’s Weekly magazine, Turkish Airlines, Qantas Airways, Boeing Australia Ltd, Compaq Computers Australia, Extreme Clothing and Leisure Wear, Vision Graphics, The Royal Australian Navy, approval from the Turkish Ministry of Culture, Pro-Diving Services Pty Ltd and TCN 9 TV network.

sion network. I communicated with Selçuk Kolay and received courteous and welcoming support.

## OUR FIRST EXPEDITION TO TÜRKİYE IN 1997

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We arrived in Istanbul, Türkiye, early October 1997. One of our most important and appreciated sponsors was Mustafa Rahmi Koç—a highly respected Turkish businessman and owner of the Rahmi Koç Museum in Istanbul, of which Selçuk Kolay was director. Both Rahmi Koç and Selçuk Kolay were significant enablers of our proposed project. At our disposal for this expedition was the Museum’s 30-metre beautifully restored MV *Saros*, equipped with a three-person twin-lock recompression chamber. Also employed to look after us was hyperbaric physician Dr Akın Toklu and his recompression chamber assistant Hasan Gül. Decompression ‘sickness’ (the “Bends”) is one of the main risks associated with diving to these depths.

The dive team comprised Richard Taylor (diving officer), Mervyn Maher (underwater video), John Riley (wreck survey) and me as stills-photographer. Included in the team, but not diving to the wreck, was maritime archaeologist Tim Smith,<sup>2</sup> providing professional guidance and interpretation of our findings. Two maritime archaeologists from the Turkish Ministry of Culture were also on board as observers of our activities with the wreck. A significant sponsor of our expedition was Channel 9 who engaged their London-based foreign correspondent Mark Burrows and a TV cameraman and sound-recorder.

Our diving officer Richard Taylor planned a dive to 86 metres with a 15-minute ‘bottom time’, calculating the ideal breathing gas mixtures and decompression requirements for our slow ascent. All four of us were using ‘open-circuit’ scuba, with the helium ‘bottom’ mix in our two larger back-mounted cylinders and two different grades of ‘nitrox’ (oxygen-enriched air) in our smaller side-mounted cylinders. We breathed 32% nitrox (32% oxygen with the remainder predominantly nitrogen), down to 30 metres, then switched to our helium mixture (‘trimix’—14% O<sub>2</sub>, 46% helium, 40% nitrogen) for the remainder of the dive on the wreck.<sup>3</sup> This would give us a comfortable ‘equivalent narcosis depth’ of only 40 metres (as if breathing just air at 40 metres) on the bottom.

At 21 metres (70 feet) depth, we passed through a very distinct ‘halocline’ (water density differential).<sup>4</sup> The top 21 metres was a murky green brackish zone of water.

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2 Tim Smith (who did considerably more work on *AE2* in subsequent years) and Selçuk Kolay were both later recognised with an Australian Government “Medal of the Order of Australia” (OAM) award.

3 Helium, which is relatively inert to human physiology down to about 150 metres, is added to reduce the relative tension of nitrogen and oxygen in our body’s tissues. With water pressure greater than about 60 metres, air (comprising mainly nitrogen and oxygen) can have deleterious effects on the nervous system.

4 The British *E11* entered the Sea of Marmara following *AE2*’s success. Its commanding officer Dunbar-Nasmith later reported that he would settle *E11* on a denser layer of water at 70 feet and then turn off the engines with someone keeping a careful watch on the depth meter.

At exactly 21 metres, we entered much clearer water—appearing as a dark, grey colour.

Selçuk later advised me that this halocline, which can vary in depth a few metres either side of 21 metres, represented clearer more dense Mediterranean water coming into the Sea of Marmara and lighter, more brackish Black Sea water moving in the opposite direction. With the top brackish layer of water blocking much of the sunlight, it became darker as we descended to the wreck. At 79 metres, we came across the wreck, fortunately at the very top of the bow post. This was a convenient and diagnostic part of the wreck to descend upon. It didn't resemble the bow of the *AE2*. I descended further, hoping to see the muzzle doors of bow torpedo tubes. Instead, I saw glass portholes! My diving buddy Riley gestured with a 'thumbs down' confirming that we were not diving on a submarine. The next part was not easy. The Channel 9 crew were aiming their big camera and microphone towards me when we climbed aboard *Saros*. "The wreck we dived was not a submarine", was all I could say. "A steamer—a small coastal steamer", said John Riley.

I was impressed with the way Selçuk managed this disappointing conclusion, with the TV crew directing their camera and microphone at him. "I'll find it", he declared. "After all" he said philosophically, "it cannot disappear". And find it he did—a year later!

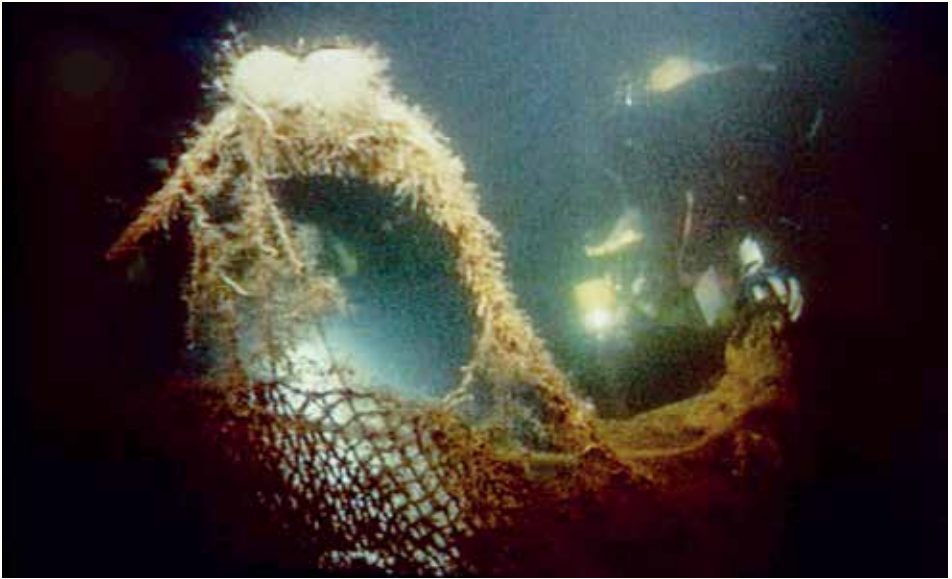
The weather deteriorated with heavy wind making the sea turbulent for safe diving. With rough seas persisting, we made the decision to make a second dive on the fifth day. Our Turkish dive advisor Tosun Sezen pressured me to forgo the diving. Tosun was a legendary diver in Türkiye and someone I found charismatic and highly experienced. But I was also under pressure from my diving team to attempt to find the region of the wreck that convinced Selçuk (who made his first dive to this extraordinary depth on air) that he had seen the submarine access hatch. Upon descending to the wreck for the second time, I found the 100 kgs weight of diving equipment no longer a burden. A different kind of 'weight' took its place—the responsibility of sending a team of friends to 86 metres in dubious sea conditions, against the advice of a respected and highly experienced professional diver.

I was trying to photograph something of the wreck as a visual record of our dive, but the visibility this time was only about arm's length. There were fishing nets and lines loosely wrapped around wreckage with ominous 'tendrils' extending out into the water, ready to continue trapping fish or diver. I saw more portholes but didn't wander far at all from the descent line. Riley got more out of this dive. He saw what turned out to be the aperture (opening) of a now absent wind funnel which directed air into the engine room. Riley recognised it by the presence of a small cog or gear that was used to turn the funnel into the wind. The "casing" that also suggested to Selçuk that he was diving on a submarine was just an unfortunate jumble created by the breaking-up of the old steamship. The depth of this funnel aperture noted by Riley was 83.3 metres—the same depth Selçuk recorded on his dive.

We were now assured that Selçuk's wreck was not a different wreck lying nearby the one we dived five days earlier. Selçuk would continue his search for the Australian submarine. We returned to Australia and maritime archaeologist Tim Smith wrote an official detailed report of the expedition for submission to Navy, Government officials and major libraries and museums.



John Riley (left) and Selçuk Kolay discuss the AE2 after the two dives in 1997 revealed a broken-up coastal steamer at 86 metres depth.



Loose nets around wreck at 86 metres depth, explored in 1997.

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## THE REAL AE2 IS FOUND A YEAR LATER

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While we were disappointed not to dive our 'Gallipoli' submarine, our expedition had settled the vexing issue of the wreck's identity concerning the Royal Australian Navy and relevant Government departments. Through TV exposure and radio interviews,

the Australian public were now informed of the important role of the Navy and its submarines in the Great War. And we made some valuable new friends in Türkiye (also new Turkish friends back home through the *Consulate-General of the Republic of Türkiye*). Of course, Selçuk Kolay would immediately continue his search for the real thing. We were also able to assure chief naval officers back home that Selçuk was a man of honesty, integrity and capable perseverance.

I was diving at Eaglehawk on the east side of Tasmania in late June of 1998, when I heard in rapid succession from Richard, Merv and Riley that Selçuk had found the *AE2*. Selçuk had apparently rung me about 1.00 am (Australian time) to tell me the news—as he had promised. He first located the wreck on 11 June 1998. His side-scan sonar images made him feel confident that he'd found the *AE2* before even diving it. His first dive on 2 July left him with no doubt that, this time, he had found the *AE2*, at a more comfortable depth of 72 metres. Selçuk sent me a four-minute video recording taken on the wreck, which was viewed by my team members and also Bronwyn Bishop MP and Naval officials in Sydney and in Canberra. Selçuk's video recording looked highly promising.

With further assistance from the RAN, Channel 9 and other appreciated sponsors,<sup>5</sup> the same team left Sydney for Istanbul in late September 1998. We had a new team member—John Thompson—the grandson of *AE2*'s lead signalman Albert Charles Thompson, referred to affectionally as “Bunts”. It was Albert Thompson who dictated a message from CMR Henry Gordon Stoker to his co-signalman to the ships outside the Dardanelles that *AE2* had successfully accessed the Sea of Marmara. John provided us welcome support on the boat and also brought along copies of his grandfather's pencil sketches of the sinking of *AE2* and his time as a prisoner of war. We were warmly met by most of the original crew of *MV Saros* from our last expedition. We travelled aboard *Saros* overnight through the Bosphorus on our way to the Sea of Marmara, arriving thirteen hours later at the small town of Karabiga. This would be our base for the one-hour journey to and from the new wreck.

Securing a boat to a shipwreck without damaging the wreck with anchors is a challenging task. Our first dive was to a muddy seafloor with no wreck in sight, even though we might have been only a few metres from it. We would try again the next day. Selçuk dropped one shot line beside the wreck, then, crossing over the wreck in his inflatable tender (using a depth finder), straddled the wreck with another weighted line that slid down the first buoyed line. To make sure we would not waste another precious photography opportunity, Riley and Taylor dived first to make sure we really had the wreck. They ascended 92 minutes later with the glorious news that they had indeed dived on an early E-Class submarine—the *AE2*! *Saros* blasted its horn and cheers arose from everyone. I was excited. I was about to dive into history.

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5 Royal Australian Navy, Channel 9, Singapore Airlines, Comprehensive Holiday Insurance, Thompson Marconi Sonar, Sonartech Atlas, the NSW Heritage Office, Pro Diving Services Pty Ltd, Vision Graphics, Extreme Clothing, Technical Diving International (Australia & New Zealand) and Compaq Computer Australia, Nikon Australia.



John Thompson (left) assists Mark Spencer before a dive on AE2 and MV Saros en route to AE2 dive site—1998.

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## MY FIRST DIVE ON AE2

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Merv Maher and I each donned our four tanks. Again, we were breathing the same ‘trimix’ as our dives a year before—O<sub>2</sub> 14%, He 46% and N<sub>2</sub> 40%. Richard Taylor had planned an 18-minute ‘bottom time’ for us. Decompression obligations stretched our overall dive time to 92 minutes. On my harness was also attached my camera equipment. A vague shadowy tear-drop outline of the top of the conning tower was the first image I had of *AE2* as we slowed our descent. I estimated we had about five metres of visibility with low overall illumination, thanks to the halocline, this time hanging at a depth of about 18 metres. Our dry suits provided comfort against the cold water (16 deg C) over the wreck. It was relatively warm (21 deg C) near the surface.

I landed gently on the rear casing just behind the conning tower and gave myself a brief indulgent 20 seconds to contemplate the significance of this moment. I was standing on the rear deck of *AE2* just as those brave submariners had done way back in 1915. I had a hard time trying to reconcile this frozen sculpture with its

35,000 miles journey to and from Australia and its nerve-racking passage through the Dardanelles Strait. I thought of the men who occupied her—the ‘soul’ of *AE2*. This wreck was my contact with history, and for some reason, it brought me closer to those ‘diggers’ at Gallipoli than I had felt before. The wreck, by virtue of its unique low-profile design, appeared intact. With a little more imagination, I envisaged the vessel lifting up off the bottom and continuing its mission. After this brief reverie, I continued with my mission – to photograph as much of the wreck as I could in the 14 minutes left. This was still the era of film cameras, so 36 exposures were all I was allowed.<sup>6</sup>

I had seen Selçuk’s video tape of the stern and was determined to look at the bow region. I swam along the top of the conning tower on the port side and made my way along the forward casing. I passed the stout morse-telegraphy aerial positioned on the starboard side of the casing. I was a ‘paparazzi’ down here, shooting everything that might help positively identify this obvious submarine as the *AE2*. TTL twin-strobe lighting, -1.3 EV strobe compensation, flash, flash, flash. I was after failsafe ‘record’ (documentary) photos needed to construct a model of the wreck, document its condition and prove its identity. Fancy, moody shots could come later. I reached the bow of the submarine and photographed its relative intact structure. Part of it was covered with fishing net. Merv’s video lights behind provided extra ‘mood’. In the years after this, a heavy drag of fishing rope or nets tore open the deck of *AE2*, like opening a sardine can. For this reason, my photos are now the only record of a relatively intact bow.

I examined the top of the conning tower before ascending. A large conger eel that we later named “Bunts” (after John Thompson’s grandfather’s nickname) protruded its head from the partially opened hatch. The open hatch was just how commanding officer Henry Stoker left it in 1915, to assist the speedy descent of *AE2* on what Stoker later described as “its last and longest dive”.

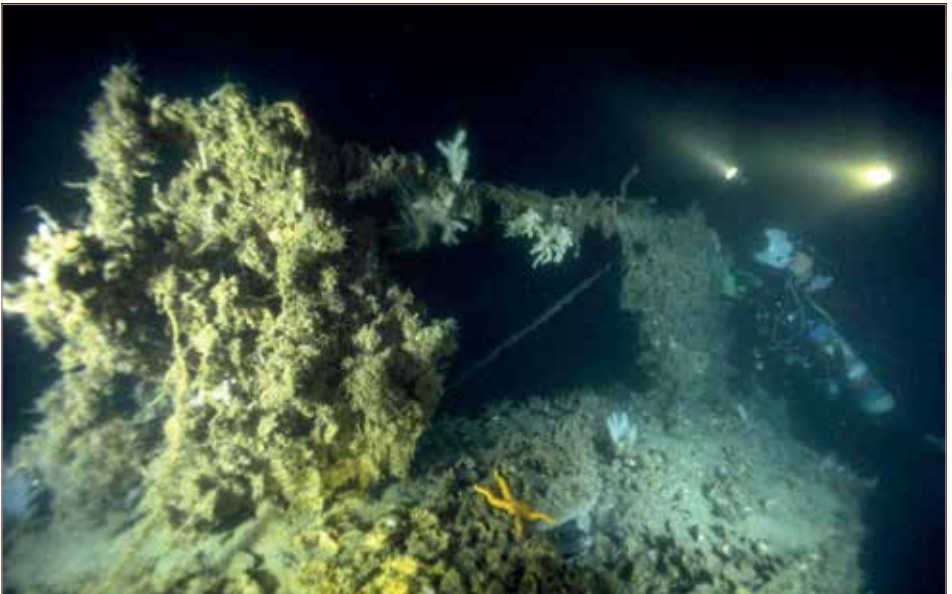
At home in Australia, we were all ‘recreational technical’ divers (not ‘commercial’). As such, we had never experienced having on standby a specialist hyperbaric doctor and an onboard hyperbaric chamber. Dr Akin Toklu would check each of us after our dives with Doppler ultrasonic monitoring equipment. Nitrogen and helium bubbles in the blood can be heard with this equipment. None of us recorded significant bubble formation, although Merv Maher and I were advised to breathe oxygen alongside the chamber for 30 minutes, presumably owing to our increased workload operating cameras.

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<sup>6</sup> Nikon Australia had provided me their first new consumer digital camera—the Coolpix 100—a small ‘point and shoot’ camera with a 0.3 MP sensor, a fixed lens, and internal memory. It was very useful to regularly update the Australian public with ‘topside’ pictures through a website set-up by the RAN.



The AE2 submarine bow showing active corrosion as a result of nets scraping across riveted panels. Mervyn Maher is in background (left) with strong video lights.



Aft starboard side of conning tower looking forward. Note forward and aft periscopes connected by an apparent deflection wire. “Bunts” the conger eel peering out of the partly opened hatch. In background with video lights is Mervyn Maher.

## OUR GENERAL ASSESSMENT OF AE2 IN 1998

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Altogether, we completed four dives on *AE2*. On the second dive, I was accompanied by Selçuk and his friend Kaya Yazar. On this dive, visibility on the wreck was reduced to one metre. Most of our video and photography was confined to the conning tower.



Access hatch on top of conning tower of *AE2* submarine.

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The third and fourth dives concentrated on the stern region, with Riley and Richard examining the bow again on their last dive. The aft hydroplanes, just like the forward ones, were well above the mud floor. I turned my camera for some vertical (‘portrait’) compositions of the well-exposed rudder, which I noted was turned slightly to starboard. This was a relevant finding, because John Thompson’s father’s sketches of *AE2* sinking depicted the rudder turned to starboard. To carry out this photograph I needed support, so rested my left gloved hand on the silty bottom, only to feel my arm sink to the elbow in soft mud. Both three-bladed propellers (each weighing 360 kgs) had one blade protruding about a third of a metre from the mud. The well-exposed stern of *AE2* is not unlike many other shipwrecks where currents seem to uncover more of the vessel at that end than anywhere else.



AE2 stern—starboard side; side-on. Note rudder turned slightly to starboard, as was noted and sketched by John Thompson's grandfather in his sketches of the sinking of the sub. Scan off Fuji G-800 (ASA/ISO) negative film.

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AE2—Merv Maher places his hand on the starboard side propeller with one blade protruding from mud floor. The aft starboard hydroplane can be seen to his right.

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The bulk of *AE2* appears to be lying in its muddy substrate about the level it would be in water—perhaps slightly more exposed. This ‘waterline’ theory was promulgated by John Riley years before in regard to iron and steel-hulled wrecks and has been widely accepted by the maritime archaeological community.

The *AE2* was found in 1998 to be intact and ostensibly in excellent condition. We noted considerable corrosion in the casing and especially on the aft sides of the conning tower, which had broad, thin riveted plates. We had no idea what the condition of the sub was under the mud. Might have earlier leaking of acid from the heavy batteries done some damage?

In looking back at this expedition, we were very fortunate—thanks to Selçuk Koyay’s persistent search and discovery of *AE2*—to have dived what would surely have to be the largest, relatively intact relic of Australia’s involvement in the Dardanelles Campaign. For me, it brought alive and seemed to make concrete a significant historical episode shared by our two countries. I was not used to diving on a substantially intact wreck. Most wrecks I have dived off the east coast of Australia are severely broken up, to the point where the wreck resembles a scattered jig-saw puzzle.

## THE IMMEDIATE AFTERMATH OF OUR JOINT TURKISH-AUSTRALIAN INVESTIGATION OF AE2 IN 1998

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Given the initial appearance of a well-preserved vessel 72 metres deep on the floor of the Sea of Marmara, serious consideration was given by parties in both countries to raise the wreck and preserve it for display. While there were instances where wrecked vessels of historical interest had been raised and conserved, the world had very limited experience in the recovery of iron or steel vessels with complex machinery.<sup>7</sup> Tim Smith commented: “The world will be watching very closely if the *AE2* is raised”. Senior political figures back home balked at the prospect of spending the then estimated \$100M-plus involved in recovering and conserving the submarine.

More scientific study, apart from our superficial photographic and video documentation of the wreck, would be needed to ascertain its residual strength and rate of deterioration. Only then could a proper management plan—involving both Türkiye and Australia—be executed. I knew at the end of our expedition in 1998 that any role I would play in future expeditions would be a more subordinate one, relying on the organisational and scientific skills of more qualified persons.

Does *AE2* have a role or ‘purpose’ for the future? A comment I made shortly after this expedition (Spencer 1999) seems as relevant as ever. “She was once an instrument of war, a symbol of conflict between two countries that now have an amicable

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7 The HN Hunley Confederate submarine used in America’s Civil War 1864 was hand-cranked to operate the propeller, so there was no complex machinery to conserve. Even so, the conservation cost to 2006 had amounted to \$97M, significantly more than the original estimated cost.

affinity towards each other. She should now be a symbol of that friendship and mutual cooperation so apparent at this time. Stoker and his crew would surely approve.”



Ascent from a dive on AE2 submarine, Sea of Marmara, Türkiye. Divers John Riley (above right) and Richard Taylor ascend from a dive on the AE2 submarine, through the halocline present at 21 metres.

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Selçuk Koday at the Naval Chapel at Garden Island in Sydney, looking at a commemorative leadlight window, designed for AE1 and AE2 (Photo Mark Spencer).

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## AE2 THE SILENT ANZAC – THE LEGACY OF SELÇUK KOLAY’S REDISCOVERY OF HMAS AE2

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### ABSTRACT

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This chapter examines the rediscovery, documentation, and conservation of HMAS *AE2*, located in 1998 by Turkish historian and diver Selçuk Kolay. It recognises Kolay’s determined quest to find and record the Australian submarine within the historical context of the Ottoman naval defence of the Dardanelles during the Gallipoli Campaign and highlights the submarine’s significance for both Australia and Türkiye.

The chapter traces the subsequent Turkish–Australian collaboration that established *AE2* as a benchmark in underwater cultural heritage management. From the 1999 Conservation Management Plan to the Silent ANZAC project and the installation of the world’s largest cathodic protection system on a steel shipwreck in 2014, the work demonstrates best practice in *in situ* preservation. Emphasising shared heritage, professional and volunteer expertise, and adherence to UNESCO Underwater Cultural Heritage principles, the chapter presents *AE2* as a model for international heritage management.

### Keywords

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HMAS *AE2*, Rediscovery, Shared Heritage, Underwater Cultural Heritage Management

## INTRODUCTION

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**T**his chapter explores the dramatic rediscovery of HMAS *AE2* by explorer and museum director, Selçuk Kolay OAM. Through the work led by Kolay, Australia's second submarine was found, preserved, and its story reimaged on an international stage. Australia and the maritime archaeology profession owe a great deal of gratitude to Kolay and his team for the hours of endless maritime survey, high-risk deep wreck diving, and logistical costs supported at the time by the Rahmi M. Koç Museum.

The discovery was driven by Kolay's passion in the story, and his wanting to provide closure for the Australian and Turkish families involved in this significant event during a key battle in the naval history of the Great War. A mark of his professionalism was his continued association in all subsequent Turkish-Australian efforts to record the wreck and tell its story. For this, Australians recognised his efforts with the granting of a high civilian honour— an Order of Australia (OAM) medal from the Governor General of Australia. For Selçuk, finding the *AE2* was always viewed as part of a wider shared-heritage journey between Türkiye and Australia, and to tell the story to an interested international audience.

I had the privilege of being, in a volunteer capacity, the project's Maritime Archaeologist supporting Australia's interest in Selçuk's first searches for the illusive wreck in 1997 and was on-site when the small Australian support team—Project *AE2*—first dived and confirmed his discovery in 1988. As a participant in all subsequent expeditions, workshops and conferences on *AE2*, the Australian team members sought to implement Selçuk's dream to bring this story to life. *AE2* had been missing for too long and everybody seemed to have forgotten her. Writing a chapter in this book which further delivers on that promise is an honour.

The success of this combined effort across many technical disciplines from historians, archaeologists, engineers, naval architects, serving and ex-Navy personnel, commercial diving, ordnance experts, defence scientists, film and TV, etc., showcases the equal volunteer passion of all who worked at and for the *AE2* story since its 1998 discovery.

This work only occurred because of Selçuk Kolay's groundbreaking discovery, tenacity, and passion to return *AE2* from the depths of a forgotten historical grave.

## WHY AE2 MATTERS

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On 25 April 1915, *AE2* became the first Allied submarine to penetrate the Dardanelles, disrupting Ottoman supply lines and influencing the Gallipoli campaign. For Australia, *AE2* represents naval courage; for Türkiye, resilience and victory; and for maritime archaeology, a rare intact E-class submarine of the First World War for research.

## THE DISCOVERY

In 1998, Turkish historian and diver Selçuk Kolay located *AE2* using side-scan sonar after years of historical research. Our small Australian volunteer team led by Dr Mark Spencer verified the wreck later that year, capturing the first images of the submarine lying at 73 meters depth in the Sea of Marmara for Australia.

It was a moment I vividly remember. I was part of the support dive team and had descended to about 20 m to reach the ascending divers and relieve them of cameras and extra gear. So, by accident, I was the first Australian team member that could confirm at the surface that the Australian dive team were all safe, and that they had confirmed that Selçuk's wreck was indeed the HMAS *AE2*. The moment was not lost on me knowing that all those tumultuous events with the Ottoman torpedo boat *Sultanbisar* happened right beneath me on 30 April 1915. My signalling to the diver support vessel *MV Saros* led to blasting its horn across the Sea of Marmara in exultation. It was a thoroughly moving moment that stayed with me throughout my professional heritage career. It was an affirmation of Selçuk's success after personal setback and investment.

## CHRONOLOGY OF EXPEDITIONS

Key milestones in the rediscovery and preservation of *AE2*:

Year	Event
25 April 1915	Gallipoli Campaign— <i>AE2</i> penetrates Dardanelles and is scuttled 30 April
September 1998	Discovery of <i>AE2</i> wreck by Selçuk Kolay
1999	First Conservation Management Plan prepared by Project <i>AE2</i>
2007–2008	Project Silent ANZAC Assessment Phase and Istanbul Workshop
2014	Project Silent ANZAC Implementation Phase: Internal survey and cathodic protection conservation program
2015	Centenary of Gallipoli joint Turkish-Australian commemorations and education programs
2023	Re-engagement and monitoring of <i>AE2</i> site

## THE DISCOVERY: A HISTORIAN'S QUEST

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Kolay, then Director of Istanbul's Rahmi M. Koç Museum, had long been fascinated by naval history. Between 1995 and 1997, he scoured Turkish and German archives, even interviewing Commander Stoker's niece in the UK. His research narrowed the search area, and in 1998, using side-scan sonar aboard the MV *Saros*, Kolay located a promising target. Diving to 73 meters, he confirmed what many had hoped: the wreck was HMAS *AE2*. This was not just a technical triumph—it was a moment of profound historical significance. For Türkiye, it was a relic of their successful defence of the homeland; for Australia, a tangible link to a story of courage at sea.

Kolay's discovery sparked international interest. Soon after, our Australian diving team led by Dr Mark Spencer and including myself, a professional maritime archaeologist at the NSW State Government (Sydney, Australia), joined him to verify their find. Kolay's September 1998 expedition produced the first photographs and video of the wreck, revealing a remarkably intact hull despite 83 years underwater. This initial survey laid the foundation for everything that followed.

## WHY AE2 MATTERS

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Before diving into the expeditions, let's pause to understand why this submarine is so important. On 25 April 1915—the day of the Allied ANZAC landings—*AE2* slipped through the heavily defended Dardanelles Strait, becoming the first Allied submarine to enter the Sea of Marmara successfully. For five days, she disrupted Ottoman supply lines, attempted to torpedo enemy vessels, follow its orders to 'run amok', and sent a wireless signal that arguably influenced Sir Ian Hamilton's decision to keep ANZAC troops ashore at Anzac Koyu (Anzac Cove). Eventually, damaged by gunfire from the torpedo boat *Sultanhisar*, *AE2* was scuttled under fire. Her crew survived, spending years as prisoners of war with four dying from disease in captivity.

This was a feat of audacity and endurance. For Australia, *AE2* represents the navy's contribution to Gallipoli—a story often overshadowed by the soldiers on the cliffs and the trenches. For Türkiye, it symbolises resilience and victory. And for maritime archaeologists, it's a rare, intact British-designed and built E-class submarine—a technological marvel of its time and the most advanced submarine type on active duty.

## THE FIRST CONSERVATION PLAN (1999)

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After the excitement of discovery came the question: what next? I wrote the 1999 Conservation Management Plan which stressed the need for detailed data on the hull's condition and its environment. The site lay in Turkish internal waters, protect-

ed under the 1983 Law on Cultural and Natural Heritage. Türkiye asserted management control, and Australia wisely agreed not to seek repatriation. Instead, both nations embraced a shared heritage approach, first advanced by Selçuk Kolay in his open invitation for Australians to join his discovery—a theme that would define all future work.

### **SILENT ANZAC: THE ASSESSMENT PHASE (2007–2008)**

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Fast forward to 2007. Under the leadership of the Submarine Institute of Australia and the newly formed AE2 Commemorative Foundation (AE2CF), a major archaeological survey—Project Silent ANZAC—was launched. This was no ordinary dive. At 73 meters, the site demanded advanced technical diving and ROV technology. The team conducted corrosion measurements, ultrasonic hull thickness tests, sediment sampling, and even inserted a non-disturbance drop camera into the conning tower. The initial images were astonishing: gauges readable, periscopes intact, and wardroom furniture preserved as if waiting for its officers to return. The aim was to better understand the internal state of the shipwreck and its conservation environment, and to document potential artefacts that would provide a human glimpse into the historical event.

The findings were mixed. While the hull was in good condition thanks to the low-oxygen environment, significant damage had occurred since 1998—anchors and trawling gear had torn away parts of the casing on the conning tower. Clearly, passive protection was not enough.

In April 2008, a landmark workshop in Istanbul brought Turkish and Australian experts together. The verdict? Preserve *AE2 in situ*. Raising her was dismissed as impractical—costing over \$100 million alone and risking irreversible long term damage, and importantly, not in line with international management practices for the world's shipwreck heritage. Instead, the plan was to install protective measures, conduct a full internal and external environmental survey, and launch education programs in both countries to further public interest and awareness in its preservation.

### **IMPLEMENTATION: ENGINEERING MEETS ARCHAEOLOGY (2014)**

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The next big push came in 2014, ahead of the Gallipoli centenary. This was maritime archaeology at its most ambitious. A joint Turkish-Australian team mobilised from the fishing village of Şarköy with a dive support vessel, custom-built ROVs, and a suite of conservation gear. Over two weeks, our joint expeditions achieved what had never been done before:

- **Cathodic Protection System installed:** The world’s largest on a steel shipwreck, designed to slow corrosion.
- **Secure Hatch:** A “top-hat” cover fitted to the conning tower to prevent illicit entry.
- **Navigation Buoy on site:** Equipped with AIS transponder and light to warn shipping.
- **Internal Survey:** High-definition video captured the control room, wardroom, and torpedo spaces. The level of preservation stunned experts—white enamel paint visible, gauges clear, and personal items scattered on the compartment floor, desks, and accommodation spaces.

This phase wasn’t just about limited disturbance archaeological science; it was about storytelling. Resulting television documentaries like *Gallipoli Submarine*, and *AE2: The Silent Anzac* aired internationally. Educational resources— graphic novels, published historical accounts, schoolteacher guides, museum exhibits, display models, public interpretation plaques, and web content have brought the submarine’s saga to life. The archaeology work continues to generate significant media attention in Türkiye and Australia.

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## SHARED HERITAGE AND GLOBAL SIGNIFICANCE

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Why does this matter beyond Türkiye and Australia? Because *AE2* has become a benchmark for best practice in underwater cultural heritage management. Every step—from Selçuk Kolay’s 1997 searches and 1998 discovery to the 2014 conservation project—followed UNESCO Underwater Cultural Heritage Principles: preserve *in situ*, minimise disturbance, and prioritise research and education. The project demonstrated how nations can collaborate on heritage that transcends borders, even when legal ownership is complex.

For Türkiye, the wreck reinforces the narrative of national survival during the Çanakkale War. For Australia, it fills a gap in the ANZAC legend, reminding us that sailors fought—and sometimes vanished—beneath the waves. For maritime archaeology, *AE2* is a living laboratory: a case study in corrosion science, deep-water conservation, and the ethics of managing shared heritage.

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## SHARED HERITAGE SIGNIFICANCE

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The work initiated by Selçuk Kolay and the Rahmi M. Koç Museum, and then the joint Turkish-Australian expeditions under the Submarine Institute of Australia (SIA), and later reframed as the *AE2* Silent Anzac banner, were consciously under-

taken to be world's best practice. Importantly, all the team members engaged in a purely volunteer basis, bringing their professional expertise from Türkiye, Australia, the United Kingdom and elsewhere. The work has been recognised internationally by UNESCO as a key example of professional collaboration, ensuring that the *AE2* shipwreck is safeguarded and curated in its 1915 wartime context, and that all work was geared at research, least-impact analysis, with public education as the goal.

## LOOKING AHEAD

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Ongoing monitoring and protection remain critical as *AE2* faces the standard threats of natural degradation of its steel hull and components, accidental impact from fishing operations and shipping. The story continues as a model for international heritage management but requires joint Government and philanthropic financial support now and into the future.

Selçuk Kolay and his discovery team have become lifelong friends of the Australian expedition members, and we are all the richer for being part of this remarkable journey.





The distinctive ramp in the forward casing of AE2—a feature only of the early “Group 1” E-Class submarines (E1–E9, AE1 and AE2). A wooden lid once covered the ramp to give access to the anchor winch (Photo Mark Spencer).

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## AE2 SUBMARINE DIVES: A DIVING PHYSICIAN'S PERSPECTIVE

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### ABSTRACT

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As a specialist in diving medicine, I was invited to provide medical support for the diving expeditions to the *AE2* submarine wreck in 1997, 1998, and 2007. **1997 Expedition:** Initially, dives were conducted to a depth of 86 metres off the coast of Şarköy on a wreck thought to be the *AE2*. However, the team discovered the wreck was a coastal steamer. **1998 Discovery:** In July 1998, Selçuk Kolay located the actual *AE2* submarine at a depth of 72 metres off Karabiga. Confirmation was achieved through video and photographic evidence. **2007 Inspection:** A multidisciplinary team returned to conduct a detailed assessment of the submarine, including hull thickness measurements, corrosion assessment, and interior examination using drop cameras. **Gas mixtures used in dives:** To avoid nitrogen narcosis and oxygen toxicity at great depths, divers used mixed gases such as trimix (oxygen, helium, and nitrogen). **Equipment:** Open-circuit scuba equipment was used for the dives in 1997 and 1998, while the diver used closed-circuit rebreather (CCR) during the 2007 expedition. Decompression and dive planning were managed using specialized software like Abyss and V-Planner. The two diving support vessels *Saros* and *Detek Salvor* were equipped with multi-place, double-lock hyperbaric chambers to treat potential diving-related illnesses. **Medical incidents:** While no significant medical issues occurred during the first two expeditions, the 2007 mission saw several incidents: Two decompression sickness cases were successfully treated in the onboard hyperbaric chamber using U.S. Navy Treatment Table 5. A critical emergency occurred when a diver was brought to the deck unconscious, without a pulse or respiration. Following successful resuscita-

tion (CPR and intubation) by the medical team, she was evacuated by helicopter to a hospital and made a full recovery. Non-diving related problems included one case of a soft tissue infection and one case of pyelonephritis (kidney infection), both of which were treated with antibiotics. **Conclusion:** The deep dives during *AE2* expeditions were complex and carried high risks, the presence of an onsite diving physician and hyperbaric chamber was crucial in managing life-threatening emergencies and ensuring the safety of the team.

## Keywords

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*AE2* Submarine, Diving Expeditions, Mixed Gases, Hyperbaric Medicine

## INTRODUCTION

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**I**t was one of the days when I had nothing much to do. I had completed my medical specialty in Underwater and Hyperbaric Medicine, but I was unemployed because the state had no available position to appoint me to. Being unemployed as a medical doctor was only possible in such a narrow field of specialization. This is no longer the case today, but that was the reality at the time. It was a period when I was trying to earn a living by taking part in various diving projects.

The phone call came from Selçuk Kolay. I knew him as the director of the Koç Museum and someone with a strong interest in diving, especially in shipwreck exploration. On the phone, he asked whether I could provide medical support for dives planned on a wreck he had discovered off the coast of Şarköy. I was looking for something to do, and this offer was more than I had expected. The work involved diving, and I would even earn a little money. Naturally, I accepted the offer without hesitation. I had taken part in other diving projects before, but I realized this one was somewhat different when I arrived at the hotel where the team was accommodated.

Diving as an activity takes place in an environment different from the human beings are used to living in, and for this reason it causes various physiological changes and can sometimes lead to medical problems. Some of these conditions require treatment in a hyperbaric chamber. For this reason, having a hyperbaric chamber and a diving physician present at dive sites where diving-related diseases may occur is an important safety measure. For the same reason, regulations require the presence of both a chamber and a diving physician in certain professional underwater operations.



Crew and passengers of MV Saros after the AE2 dives. Back row (left to right): Tim Smith, Hasan Gül, John Thompson, Şener Gözaydın, Richard Tyler, Cpt. Müslüm Ziya Yıldız, Dr Akın Savaş Toklu, John Riley. Front row (left to right): Mark Spencer, Mervyn Maher, Ahmet Ali Taşçı, Hamit Aslan, Mehmet (Photo Mark Spencer).

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The multi-place, double-lock hyperbaric chamber in MV Saros. Hasan Gül and Dr Akın Savaş Toklu (right) at the recompression chamber on board MV Saros during the two excursions in 1997/98 to identify AE2 (Photo Mark Spencer).

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## THE AE2 DIVES IN 1997–1998

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After settling into the hotel where the diving team was staying in October 1997, the nature of the diving operation for which medical support was requested became clearer to me. The dives were to be conducted on a wreck that Selçuk Kolay had discovered off the coast of Şarköy and believed might be the *AE2* submarine. However, the wreck lay at a considerable depth of 86 metres. The divers who arrived from Australia—Mark Spencer, John Riley, Mervyn Maher and Richard Taylor—planned to use open-circuit scuba equipment with mixed gases for dives to this depth.

At such depths, air should not be breathed because the nitrogen it contains has a narcotic effect. When diving with air beyond certain depths, the increase in the partial pressure of nitrogen causes a narcotic effect known as “rapture of the deep” or nitrogen narcosis. Because nitrogen narcosis affects cognitive function, it poses a



AE2 expedition—1998. Dr Akın Savaş Toklu (rear left), with chamber operator Hasan Gül, supervise Mervy Maher (bottom left) and Mark Spencer, who are both breathing pure oxygen for 30 minutes after a dive on the stern (5/10/98) of *AE2*. Both had some detectable bubbles in their blood stream, so this was a precautionary procedure (Photo Mark Spencer).

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potential risk for diving accidents. For this reason, mixed gases are used in deep diving to prevent narcosis, with helium added to the breathing gas because it has negligible narcotic effect. However, at great depths the partial pressure of oxygen can also reach toxic levels, so the oxygen fraction of the breathing gas must be adjusted according to the planned depth, typically keeping the partial pressure lower than 1.4 - 1.6 ATA. In technical diving using mixed gases, different gas mixtures may be used at different depths to reduce adverse effects, lower helium costs, and shorten decompression time.

During the first expedition to *AE2* in October 1997, poor weather conditions allowed diving to 86 metres on only two days. The dives were supported by the 30-metre vessel *Saros*, which was equipped with a multi-place, double-lock hyperbaric chamber. Dive planning was carried out using Abyss Dive Planning Software. With a planned bottom time of 15 minutes, the divers descended to 30 metres breathing nitrox 32 (32% oxygen, 68% nitrogen), and below that depth breathed 14/46/40 (14% oxygen, 46% helium, 40% nitrogen) trimix as bottom mixture. The gases used during decompression had higher oxygen fractions. Post-dive Doppler examinations showed no significant bubble formation, although as a precaution two divers were asked to breathe 100% at surface for a period.

The dives conducted by the four divers in October 1997 revealed that the wreck Selçuk Kolay had found was actually a coastal steamer. This result did not discourage Kolay; on the contrary, it further motivated him to continue searching. In July 1998, he contacted me again regarding *AE2*. He believed he had found the submarine at a depth of 72 metres off Karabiga, but needed photographic or video evidence to convince the Australian team. The diving team consisting of Selçuk Kolay, Kaya Yazar and Levent Yüksel conducted dives to 72 metres in July 1998 and obtained footage confirming that the wreck was indeed *AE2*. Although two of the divers breathed air at that depth—which concerned me as a diving physician—no significant problems attributable to nitrogen narcosis were reported.

The confirmation that *AE2* had truly been found generated excitement among interested parties on the other side of the world, down under. As a result, the Australian divers returned in September 1998 and conducted further dives on the wreck using mixed gases. As before, dive planning was carried out using Abyss Dive Planning Software. This time, the divers used 14/46/40 trimix as the bottom mixture, at the dives with a bottom time of 18 minutes and a total dive time of 92 minutes. The footage recorded by Mark Spencer and Mervyn Maher suggested that further dives would follow—and indeed, another expedition took place in 2007.

From a diving medicine perspective, no significant problems were encountered during the 1997 and 1998 *AE2* dives. Post-dive Doppler examinations for venous bubble detection also showed no findings of concern.



Dive director for expedition: Richard Taylor being examined by Dr Akın Savaş Toklu, after a dive on AE2, Sea of Marmara, Türkiye. Dr Toklu is using a Doppler listening device to assess the load of bubbles present in blood stream after dive (Photo Mark Spencer).

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## THE AE2 DIVES IN 2007

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Following the images obtained during the 1998 dives, a multidisciplinary volunteer team composed of specialists from different fields returned in September 2007 to conduct further dives on *AE2*. The team travelled from Australia to inspect the wreck, take photographs and video recordings, assess damage to the submarine, measure corrosion, hull thickness and structural strength, collect water and sediment samples from the site, and examine the interior of the submarine using drop cameras and endoscopic cameras.

As in previous expeditions, mixed gases were used during the 2007 dives; however, this time the dives were conducted using closed-circuit rebreather systems. Surface support was provided by the 33-metre dive support vessel *Detek Salvor*, which was equipped with a multi-place, double-lock hyperbaric chamber. The diluent gas used in the closed-circuit systems was 13/60/27 nitrox. In addition, the divers carried open-circuit bailout cylinders for emergency use, containing a 13/16/27 bottom mix and a 30/40/30 decompression gas. Decompression stations were established at

depths of 4.5, 6 and 9 metres, each supplied with 12-litre cylinders containing 50/50 nitrox or 100% oxygen.

During these dives, the partial pressure of oxygen at depth was adjusted so as not to exceed 1.3 ATA. The planned bottom time was 30 or 40 minutes, with total dive durations of 147 or 197 minutes. Decompression planning was carried out using the V-Planner VPM-B/E software.

The divers used full-face masks equipped with integrated communication systems. During the dives, the *Detek Salvor* maintained a comprehensive safety setup, including two safety divers in scuba gear, one lookout, one dive supervisor, one project manager, and a small boat with a diver on standby.

Pulmonary function tests were performed before and after the 2007 dives to assess whether such dives had any acute effects on lung function; no significant adverse effects were detected. The study was conducted with the participation of Dr Ayşen Kolat, a fellow underwater physician from the same department, who is currently based in Australia.

Two cases requiring recompression therapy were treated in the hyperbaric chamber onboard the vessel, using U.S. Navy treatment tables. For emergencies requiring hospital care, the use of nearby healthcare facilities and available transport options had been planned in advance (Toklu and Kolat 2008).

## **MEDICAL ISSUES DURING THE AE2 DIVES: WHAT COULD HAVE OCCURRED AND WHAT ACTUALLY OCCURRED**

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The physiological changes and health problems encountered during diving are related to the increase in ambient pressure during the dive and to being in an environment very different from normal living conditions. Some pressure-related health problems result from the effects of changing pressure on gas volumes, while others result from the increased partial pressure of the gases being breathed.

Changes in gas volume caused by pressure differences can create problems in air-filled spaces in the body such as the middle ear, paranasal sinuses and lungs. For this reason, during descent divers must equalize the pressure in these spaces, which naturally tend to decrease in volume as ambient pressure increases. Because cavities such as the middle ear and sinuses are connected to the outside environment, equalization is usually possible with appropriate manoeuvres performed by the diver. During scuba diving, because the diver breathes continuously, problems in the lungs during descent and ascent are uncommon. In addition, the diving mask and dry suit worn in cold water also create air spaces, so pressure equalization must be ensured in these areas as well.

Tissue damage caused by pressure changes is known as barotrauma, and the most dangerous form is arterial gas embolism resulting from pulmonary barotrauma. Pulmonary barotrauma may occur if a diver holds their breath during ascent or if there is

an underlying lung condition that can cause air trapping. Because the divers involved in the *AE2* expeditions were highly experienced, I did not expect serious barotrauma to occur—and indeed, no barotrauma-related problems were encountered in any of the four expeditions in which I participated.

Some other potential problems in diving are related to the increased partial pressure of the gases being breathed, which leads to greater dissolution of these gases in body tissues and fluids. If the partial pressure of nitrogen exceeds certain limits, nitrogen narcosis may develop; if the partial pressure of oxygen exceeds safe limits, there is a risk of oxygen toxicity. To prevent these conditions, mixed gases were used during the dives so that the partial pressures of both nitrogen and oxygen remained within safe limits. Another potential problem, particularly in closed-circuit systems, is carbon dioxide toxicity or oxygen toxicity due to technical failures, but no such incidents occurred.

Another diving related disease that can occur after deep and prolonged dives is decompression sickness. This condition is caused by the formation of gas bubbles when inert gases such as nitrogen or helium, which dissolve in the body during the dive, cannot be eliminated adequately during ascent. The time between leaving the bottom and reaching the surface is known as the decompression time. During ascent, the rate of ascent must not exceed certain limits, and in some cases decompression stops are required at specific depths to allow sufficient elimination of inert gas. Tables and dive computers are used for this purpose. Inadequate decompression increases the risk of decompression sickness. The number and location of bubbles determine the symptoms and severity of the condition. The main treatment for decompression sickness is recompression therapy in a hyperbaric chamber, and the earlier treatment is started, the better the outcome.

During the *AE2* dives, the two cases of decompression sickness described below were observed and treated in the hyperbaric chamber onboard the dive support vessel.

## Case 1

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On the third day of diving, one diver surfaced without any apparent problems after a dive to 72 metres with a 30-minute bottom time. While removing her dry suit, she noticed skin colour changes on his arms, trunk and legs. Following the examination, she was found to be suffering from decompression sickness. The diver initially resisted recompression treatment, suggesting that the symptoms were due to dry-suit squeeze. However, because the appearance of the lesions was not consistent with suit squeeze and because their colour changed with oxygen administration, the diver was diagnosed with Type I decompression sickness with cutaneous manifestations and was taken for recompression therapy. No other abnormalities were found on examination. The diver was taken to a depth of 60 feet in the hyperbaric chamber within 30 min after surfacing, and during the first 10 minutes of recompression treatment her

skin lesions resolved completely. Treatment was completed using U.S. Navy Treatment Table 5 (TT5). She was advised not to dive for one week. Despite this advice, she chose to return to diving after only two days.

## Case 2

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On the fourth day of diving, another diver complained of pain in his right shoulder after surfacing. While preparations were being made to examine him, a distress call was received from a diver that had just entered the water. During this time, the diver continued to breathe oxygen at the surface. After the emergency related to the drowning incident had been addressed, he was taken to the hyperbaric chamber. His shoulder pain resolved immediately upon descent to 60 feet, and he was treated using U.S. Navy Treatment Table 5. After completing hyperbaric treatment, he had no remaining symptoms and was advised not to dive for one week.

Being underwater also carries the risk of drowning in the event of unexpected problems. During the *AE2* dives, a drowning incident occurred, as detailed below.

## Case 3

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On the fourth day of diving, a distress call was received regarding one of two divers who had just entered the water. Safety divers immediately entered the water and reached the diver, who was calling for help on the surface approximately 15 metres from the entry point. Meanwhile, medical emergency equipment was prepared on the deck of the *Detek Salvor*. When the buddy of the diver who asked for help was brought on deck, she was unconscious, cyanotic, and had moderately dilated pupils. She was not breathing and no pulse could be detected.

There was an anaesthetist on the diving team, Andrew Fock, so the casualty was immediately intubated and artificial ventilation with oxygen was started. At the same time, her dry suit was cut open and cardiopulmonary resuscitation was initiated. Intravenous access was established, fluid infusion was started, and adrenaline was administered both endotracheally and intravenously. Within 4–5 minutes, spontaneous circulation and breathing returned, and her colour began to improve.

Based on clinical examination and review of the dive profile, it was concluded that the diver did not have a condition such as arterial gas embolism or decompression sickness that would require recompression therapy. A decision was therefore made to transfer her to a hospital with intensive care facilities. While oxygen ventilation continued, emergency transport was arranged. The casualty was transferred by Coast Guard boat to Erdek and then by helicopter to a private hospital in Bursa, where he received intensive care approximately 2.5 hours after the incident.

The patient was weaned from mechanical ventilation within the first 24 hours, and her level of consciousness returned to normal once sedative medications were discontinued. No neurological sequelae were detected during follow-up, and she was discharged from hospital three days later.

## OTHER MEDICAL ISSUES (UNRELATED TO DIVING)

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During the 2007 *AE2* expedition, two additional health problems occurred among team members, unrelated to diving. One member of the surface team developed a soft tissue infection around a traumatic foot wound; symptoms resolved following intravenous antibiotic treatment. Another diver presented with high fever and dysuria. When he failed to respond to empirical antibiotic therapy, he was taken to Biga State Hospital for further investigations and was diagnosed with pyelonephritis. Intravenous antibiotic treatment was started, and his symptoms resolved over the following days.

## CONCLUSION

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The dives performed to *AE2* were deep dives and expeditions were complex and carried high risks. For such diving operations, the presence of an onsite diving physician and hyperbaric chamber was crucial in managing life-threatening emergencies and ensuring the safety of the team.

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## THE STRUGGLE BETWEEN AE2 AND SULTANHİSAR: A STORY OF DAVID AND GOLIATH

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### ABSTRACT

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This article analyses the events between the Australian *AE2* Submarine and the Turkish *Sultanhisar* Torpedo Boat on 30 April 1915 based on the accounts of their captains, Stoker and Ali Rıza. The main sources of information for the article were Captain Henry Stoker's memoirs "*Straws in the Wind*" published in 1925 in London and Captain Ali Rıza's memoirs "*How I sank the AE2 Submarine in Marmara*" published in 1947 in Istanbul in Turkish which was not publicly available in English until 2008. The publication "*Beneath the Dardanelles*" by V & H Basarin, published in Sydney by Allen and Unwin in 2008 was the go-to document for these memoirs.

The struggle between a giant 762 tonne submarine [*AE2*, aka Goliath] and a 97-tonne petite gunboat [*Sultanhisar*, aka David] in most interesting circumstances in the Sea of Marmara is probably unique in the annals of the sea battles. This struggle is conveyed to us today via the memoirs which agree on most points. However, there are of course differences of recollections, particularly after 10 years for Stoker and 30 years for Ali Rıza. This article discusses the discrepancies, agreements and the differences of opinion which are highlighted, and comments are made as necessary.

### Keywords

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*AE2*, *Sultanhisar*, Captain Stoker, Captain Ali Rıza

## THE ADVERSARIES

### The AE2 Submarine

Below the technical details of the *AE2* submarine are provided (Wikipedia; Sea Power Centre Australia).



HMAS *AE2*, in dock in Sydney, c. 1914

#### History



Australia

<b>Builder</b>	Vickers Armstrong
<b>Laid down</b>	10 February 1912
<b>Launched</b>	18 June 1913
<b>Commissioned</b>	28 February 1914
<b>Fate</b>	Scuttled, 30 April 1915
<b>Class &amp; type</b>	E-class submarine
<b>Displacement</b>	762 tonnes (submerged), 599 tonnes (surfaced)
<b>Length</b>	181 ft (55 m)
<b>Beam</b>	22 ft 6 in (6.86 m)
<b>Draught</b>	12 ft 6 in (3.81 m)
<b>Installed power</b>	<ul style="list-style-type: none"> <li>• 2 × 8-cylinder diesels, 1,600 hp (1,200 kW) surfaced,</li> <li>• battery-driven electric motors, 840 hp (630 kW) submerged</li> </ul>
<b>Propulsion</b>	2 × propeller shafts
<b>Speed</b>	<ul style="list-style-type: none"> <li>• 15 knots (28 km/h; 17 mph) surfaced</li> <li>• 10 knots (19 km/h; 12 mph) submerged</li> </ul>
<b>Range</b>	<ul style="list-style-type: none"> <li>• 3,000 nmi (5,600 km; 3,500 mi) at 10 knots (19 km/h; 12 mph) surfaced</li> <li>• 65 nmi (120 km; 75 mi) at 5 knots (9.3 km/h; 5.8 mph) submerged</li> </ul>
<b>Test depth</b>	200 feet (61.0 m)
<b>Complement</b>	3 Officers 29 Ratings
<b>Armament</b>	8 × 18-inch torpedoes

## Sultanhisar Torpedo Boat

Below technical details of *Sultanhisar* Torpedo Boat are provided (Wikipedia; Turkey in the First World War).



### History



Ottoman Empire/Republic of Türkiye

<b>Name</b>	<i>Sultanhisar</i>
<b>Namesake</b>	Sultanhisar
<b>Owner</b>	Ottoman Navy, Turkish Navy
<b>Ordered</b>	25 October 1906
<b>Builder</b>	Schneider & Cie in Chalon-sur-Saône, France
<b>Laid down</b>	1906
<b>Launched</b>	1907
<b>Completed</b>	1907
<b>Commissioned</b>	1907
<b>Recommissioned</b>	1924
<b>Decommissioned</b>	1928
<b>Stricken</b>	1935
<b>Fate</b>	Scrapped 1935
<b>General characteristics</b>	
<b>Type</b>	Torpedo boat
<b>Displacement</b>	97 tons (full load)
<b>Length</b>	40.2 m (132 ft)
<b>Beam</b>	4.4 m (14 ft)
<b>Draft</b>	1.9 m (6.2 ft)
<b>Propulsion</b>	Steam, 1 shaft. 2 Du Temple water tube, Schneider & Cie, 11.2t coal 1 triple expansion 3cyl., 2200 ihp, Schneider & Cie
<b>Speed</b>	26 knots (48 km/h) (trial), 16 knots (30 km/h) (1915)
<b>Complement</b>	3 officers, 20 ratings (1907); 32 Ottomans, 4 Germans (1915)
<b>Armament</b>	2x37mm (1.46 inch) H guns, 2x450mm (18 in) SK torpedoes



Sultanhisar sinking the Australian submarine AE2, oil painting by Hüsni Tengüz, Istanbul Naval Museum.

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## THE CAPTAINS

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### AE2: Henry Stoker

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Henry Stoker was born in 1885 in Dublin and died in 1966 in London (Sea Power Centre Australia).

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**Henry Hugh Gordon Dacre Stoker** joined the Royal Navy as a 14-year-old Cadet on 15 January 1900. His initial service was in the training ship HMS *Britannia*, moored in the river near Dartmouth. He was promoted to Midshipman on 30 May 1901 and posted briefly to the battleship HMS *Jupiter*, part of the Channel Fleet, before joining the battleship HMS *Implacable* which served in the Mediterranean. Later on he was selected to be a submariner and in 1913 he was loaned to Royal Australian Navy to command the newly built *AE2*.

Stoker married Olive Joan Leacock in 1908 and was divorced in 1919 with no children.

On the morning of 25 April 1915, Stoker took *AE2* through the Dardanelles (75 km in length), and after evading Turkish minefields, shore batteries and patrolling warships she broke through into the Sea of Marmara, thus becoming the first Allied submarine to do so after repeated failures by others.

Unfortunately for *AE2*, her success was short lived. On 30 April 1915, while attempting to rendezvous with another Allied submarine, she was caught on the surface by Turkish *Sultanhisar* Torpedo boat and badly damaged. The *AE2*'s pressure hull was breached by shellfire, and Stoker ordered his crew to abandon ship and it was scuttled.

After their capture, the crew of *AE2* were held as prisoners of war by the Turks. The officers were separated from the men, and Stoker spent the next three and half years in various Turkish prisons and internment camps until the war ended in November 1918. Stoker was repatriated to England in December 1918 and reverted to Royal Navy service on 9 February 1919.

Stoker was awarded the Distinguished Service Order (London Gazette, 22 April 1919) 'In recognition of his gallantry in making the passage of the Dardanelles in command of HM Australian Submarine *AE2* on 25 April 1915'. Six months later he was mentioned in dispatches (London Gazette, 17 October 1919) 'For valuable services in HM Australian Submarine *AE2* in the prosecution of the war'.

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### **Sultanhisar: Ali Rıza (Talayman)**

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**Captain Ali Rıza** was born in Istanbul in 1880 and joined the Ottoman Navy when he was 22 years old. He graduated as an engineer two years later and after having worked on many ships and battleships, he was made captain of the *Sultanhisar* in November 1914. After sinking of the *AE2* and capture of its crew on 30 April 1915, he was awarded the Ottoman Golden War Service Medal by the Sultan and also received the German Iron Cross by the German Kaiser. During the First World War, Ali Rıza was given commission of several other battleships. After the War of Independence, he received a medal for bravery and service from the newly created Republic of Türkiye. In 1924 he was appointed as the deputy captain of the famous dreadnought *Yavuz* (German *Goeben*) and in 1925 he was appointed as the captain of the *Mecidiye* Cruiser and later on the Commander of the Fleet. In 1928, he retired, after a distinguished career in the Ottoman/Turkish Navy. He was married in 1921 in Istanbul and had three children. After retirement, he spent his life in Istanbul and died there in 1949 at the age of 69.



## MAPS



Dardanelles Strait, 1915 AE2's Last Voyage (AE2 Commemorative Foundation 2010).



Location of AE2's sinking (AE2 Commemorative Foundation 2010).

## THE POINTS OF INTEREST

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### 1. Weather

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#### **Stoker's Recollections**

- a. "Three a.m. on Sunday, 25 April (1915), it was absolutely dark, still and dead calm..."
- b. "It was a beautiful day, bright sunshine (the first crew had seen for two days) but not a breath of wind; how did we long for a breeze to come and ruffle the glassy stillness of the water" [most likely to be the morning of 27 April 1915]

#### **Ali Rıza's Recollections**

- a. "It was a day of clear skies and lots of sunshine; the sea was calm". [27 April 1915]
- b. "The sea was as clear and calm as a well." [30 April 1915]

#### **Comment**

Both captains in their recollections agree on the weather being mostly calm during the five-day period.

This of course is disadvantageous for the submarine as mentioned by Stoker "The damnable calmness of water did not permit of even the shortest spell of observation without the periscope being seen."

### 2. Torpedoing a destroyer [Peyk-i Şevket] early on 25 April 1915

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#### **Stoker's Recollections**

"One of the destroyers was now very close, attempting to ram us on the port side, so at the moment of firing I ordered 70 feet. A last glance as the periscope dipped showed the destroyer apparently right on top of us, and then, amidst the noise of her propeller whizzing overhead, was heard the big explosion as the torpedo struck."

**Ali Rıza has no recollection about this incident.**

#### **Comment**

There is no record of any destroyer being hit by a torpedo from the *AE2* on 25 April 1915. It is likely that the torpedo exploded on the shore.

### 3. Firing at Turgut Reis Cruiser

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#### **Stoker's Recollections [early morning-26 April 1915]**

“Right abeam was a ship looking mighty big at a range of 500 yards, and I jumped to the conclusion that she was the second or rearmost ship. The bearing for firing of the port torpedo was on, and we fired. The ship dodged, the torpedo passed ahead of her and then looking around, I found to my disgust I had fired at the smaller of the two ships, a cruiser. The other, a battleship—either the *Barbarossa* or *Turgut Reis* was following, but it was now too late...”

#### **Ali Rıza's Recollections**

“On the same day, this submarine attacked the *Turgut Reis* destroyer, which was patrolling the area between Çanakkale and Maidos, and fired a torpedo. However, it failed to achieve a successful outcome. This attack on *Turgut Reis* made it necessary to increase the frequency of searches in that sector of the Strait.”

#### **Comment**

The firing of the torpedo by *AE2* to one of the ships when they are very close to each other could be interpreted by Ali Rıza and others as the target was *Turgut Reis* or the torpedo was actually fired at *Turgut Reis*. In either case, the torpedo missed the vessel.

### 4. Cat and Mouse Play with the Inebolu Gunboat [28 April 1915]

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#### **Stoker's Recollections**

“On returning towards Gallipoli we observed a small gunboat patrolling across the end of the Dardanelles Strait. She was too small a vessel on which to expend a torpedo, but by no means too small to be made of use. We decided to play a trick with the object of giving an impression that another submarine had come through into Marmara.

Plunging to 70 feet we passed underneath the gunboat, steering down the Strait, and then, turning, rose to 20 feet, put up the periscope, and steered for the Marmara again. Nearer and nearer we drew to the gunboat—indeed, we began to wonder if she was ever going to see us. So close did we get that I could plainly see two stout and elderly gentlemen leaning languidly up against the compass on the bridge. Suddenly one of them gave a marvellous leap perpendicularly in the air, and with a sweep of the arm which knocked the other gentleman's fez off, pointed to the periscope, now not 200 yards off. Then such hurrying and scurrying and waving of arms! Men rushed in all directions, and the two stout gentlemen looked as if any moment they might fall off their bridge into the water!

It was all vastly entertaining, so entertaining that one was inclined to forget the object of their great excitement was the taking of our lives. The guns commencing to spit, and the stout gentlemen gallantly making up their minds to try and ram, reminded us of this fact, so we plunged away to safety into the water!”

### **Ali Rıza’s Recollections**

Relaying his chat with the captain of *Inebolu* Gunboat Lütfi Bey throws an interesting take on the encounter with the *AE2*:

“What shall I say Rıza?” he began. ‘I get angry even as I remember and think about it. This is what happened. When we were coming from Istanbul yesterday, we came across a submarine in the vicinity of Karaburun. I immediately turned the direction of the ship that way and quickly began getting within cannon firing range. You know the nervousness and enthusiasm of the soldiers. All my soldiers almost turned into lions. I was glad for the coincidence fate had delivered. It was impossible for the submarine to escape.’

- ‘We were within shooting range. I gave the order to fire the cannons. The submarine was startled. It was not moving. I began to move the ship even faster towards her. I had started feeling the joy of this certain victory more strongly on the command bridge.

Would you believe, at that very moment the ship just stopped. I looked behind, the German Captain Gerc, who was sent to accompany me, had moved the command lever to stop. I was totally taken by surprise. I could not understand the meaning of this sudden halt. By the time I gave the order for full steam ahead the submarine submerged and it was out of my clutches. If it were you, wouldn’t you get angry? Why do we have to suffer these men?

Lütfi was speaking in a bitter manner. It was impossible not to agree with his anger and grief. The conversation, which we tried to steer into various other topics kept coming back to the submarine that got away just as it was about to be captured. We were kind of tired of talking about the same issue for many hours.

A deep silence surrounded us. It was very late. The silver haired head of the *Inebolu* Captain was falling to his chest. The dawn began to break.”

### **Comment**

It is interesting to note how different stories evolve from the same incident. It is possible that Captain of *Inebolu* Lütfi Bey was not aware of the trick *AE2* was playing and there really was not a real chance for *Inebolu* to ram or hit the submarine with gunfire.

## 5. The attack on the Troop Carrier Boat No. 38 [27 April 1915]

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### **Stoker's Recollections**

“The ship in sight proved to be but small—about 1,500 tons—but doubts as to her being worthy of attack were quickly settled by seeing two destroyers were guarding her. If worth guarding, she was worth sinking, be the weather conditions for attack suitable or not.

One destroyer was ahead of her, the other on her starboard beam. Our object was to get across the bows of the second destroyer, in between her and the ship. This was successfully accomplished. When the periscope was hoisted for the last time the ship was just on our bow about 300 yards distant, the destroyer close on our port quarter, and our presence obviously not previously suspected. The short interval of time necessary to bring the right bearing on for firing the bow tube saw the range shortened to 200 yards, the ship behind being beam on presenting a perfect target. No dodging would save her now!

‘Bow tube, stand by! Fire!’

Through the periscope I saw the rush of escaping air as the torpedo left the tube, and then—words cannot describe my feelings at the sight—torpedo peaceably rose to the surface and lay motionless, while the compressed air which gives the motive power puffed futilely out of its stern. The torpedo’s engines had failed to start.

Never has ship had more fortunate escape. Nothing on earth could have saved her had the torpedo run.”

### **Ali Rıza's Recollections**

I turned my binoculars in that direction. The tiny passenger ferry was full to the brim, and fast approaching us. It was so full that it had slightly tilted to starboard. I began steering alongside her by reducing our speed a little and turning parallel to the ferry which had by then, reached us. Many of the soldiers on the ferry had come out on deck and were happy as a result of this beautiful spring weather, on the one side a drum and zurna (a pipe-like double reed instrument) were playing folk music and young men from the villages were dancing in the middle. These young men were going to squarely face death within a couple of hours. They knew that most of those who went there did not come back and those who returned, at best, did so having been shattered into many pieces.

However, the warrior spirit of the Turk was rising above all these thoughts. They did not think of war as a disaster, they considered it a festival where the attributes of their race would shine the best. Therefore, they were going to war laughing and dancing.

I was thinking all these things on my command bridge and looking at *No. 38*. We were close to Gelibolu. I just did not want to change the direction of my ship. My emotions were controlling me. And, as a result of a strange premonition, I was not able to move away from *No. 38*.

At that moment, I noticed a torpedo fast approaching 38 from our port side. I immediately sent a signal to 38. At once, 38 turned towards the land and started moving towards the shore. The drum and zurna sounds of a moment ago had stopped. Chaos took over the ship and everyone grabbed their weapons. However, the enemy that had sent the torpedo was nowhere to be seen. Instead, there was the white bubbly trail left by the torpedo on the sea surface. The torpedo did not hit 38; it raced towards the land and exploded there with a big bang.

### **Comment**

The manoeuvres of *AE2* to get between *Sultanhisar* and Troop Carrier *No. 38* was successful and both captains agree on this point. The captains also agree that the torpedo was not effective. They disagree on its ineffectiveness; Stoker talks about the torpedo not running and Ali Rıza remembers it missing the target and nowhere to be seen and later exploding on the shore. It is likely that the torpedo sank away into the sea.

## **6. Encounter of Sultanhisar and AE2 [30 April 1915]**

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### **6.1. Sighting**

#### **Stoker's Recollections**

"... dived to investigate some smoke farther along to the westward. This smoke, which was approaching, soon singled out to indicate only one ship, and such dense volumes of it were arising that one assumed she must be fairly big. When, however, her mast and funnels hove in sight one could see she was only a torpedo craft moving at high speed, and as her course lay direct for us it would be necessary to dive out of the way until she went past."

#### **Ali Rıza's Recollections**

"We are going to look for a submarine around Karaburun. Pile the British coal in front of the boilers, which we keep for situations that require speed. Place spotters on the deck. They should watch very carefully everywhere and immediately let me know of every ship they see.

The ship reached offshore from Karaburun. Then, the signalman yelled:

- 'There is a ship ahead'.

All eyes were turned in that direction. The long distance and the still thick morning mist were preventing us from seeing ahead with clarity. The binoculars were not strong enough to hazard a guess about the type of the approaching vessel. Yet, the silhouette that could be seen did not look like any other vessel we were familiar with."

### **Comment**

There were no surprises; both captains have seen each other. Interestingly it was the British high quality coal which provided the extra speed to *Sultanhisar* to catch up with *AE2*.

## **6.2. AE2 Losing Total Control of its Diving**

### **Stoker's Recollections**

“After an adjustment of the ballast tanks, we dived to 50 feet... suddenly, and for no accountable reason, the boat took a large inclination up by the bows and started rising rapidly in the water. All efforts at regaining control proved futile... and at last broke surface.”

### **Ali Rıza's Recollections**

All eyes were scanning the sea. Minutes felt like a year. And the enemy ship did not show even the slightest sign of its presence. These minutes that were full of impatience were broken by a scream that came out of all mouths:

- ‘It’s coming out! Appearing again!’

A bulge was slowly rising on our port side. A two-meter-tall tower was coming towards us above the water. The distance was about 1,500 meters. I turned the wheel towards it, having ordered the guns and rifles to fire. The submarine was overwhelmed by the renewed and continuous firing. It again began to submerge.

### **Comment**

The loss of total control of *AE2* is possibly due to a thermocline present in the waters in which it was travelling. Also Ali Rıza saw a large oil slick where *AE2* was first spotted and before it dived. Probably what happened will never be fully understood.

## **6.3. Use of Torpedoes**

### **Stoker's Recollections**

“It afterwards transpired that the torpedo-boat then fired two torpedoes at us; yet they missed this practically standing target at such short range.”

### **Ali Rıza's Recollections**

Right then, I saw a torpedo coming towards our starboard bow. A small manoeuvre of the helm was enough to avert this danger and the torpedo passed by us like a dolphin leaving a white foamy trace behind it towards the open sea.

“Then I decided to fire torpedo number one towards the submarine. The torpedo officer repeated my order:

- ‘Torpedo number one. Fire!’

I heard the fuse. The torpedo did not leave the casing. We had missed a great opportunity. Angrily, I shouted to the torpedo officer:

- ‘What happened?’

- ‘The gunpowder did not ignite sir’

I decided to fire my last torpedo. It was certain that a hit registered by this weapon would render the submarine useless.

The submarine had turned towards Erdek Bay. I was looking for a suitable opportunity.

- ‘Fire’.

With my order, the fuse exploded. The bulky body of the torpedo leapt towards the water. This was followed by a huge rustle. Our torpedo was rushing towards the submarine leaving a white bubbly trail behind it.

All ears expected to hear a huge explosion and all eyes expected to witness the pieces of iron and human limbs thrown above water along with it.

However, the torpedo went past the submarine’s conning tower. This miss crushed our spirits.

Our small guns, despite the hits they achieved, were not sufficient to sink the submarine.

### **Comment**

Both captains remember about the use of torpedoes, however Stoker does not mention firing a torpedo towards *Sultanhisar* nor does he mention a torpedo being fired at her. Whereas Ali Rıza mentions both the torpedo being fired at *Sultanhisar* and in vivid detail his own failure in torpedoes fired to *AE2*. There is a contention that there might be one torpedo was left in *AE2* when it was scuttled. If Ali Rıza’s recollection is correct and that a torpedo from *AE2* was fired at close range, then the wreck of *AE2* does not contain the last torpedo. A point requiring further investigation!

## **6.4. Ramming of AE2 by Sultanhisar**

### **Stoker’s Recollections**

Stoker has no comment on this matter.

### **Ali Rıza’s Recollections**

I had lost all my torpedoes. My guns were ineffective.

Collision... When I thought of that, I had one look at my ship and another look at the vessel in front of me. Next to this 800 plus tonne vessel, mine looked like a din-

ghy. Could the strength of the tiny 93 tonne body of *Sultanhisar* open a wound on the ship that looked like a giant in comparison to her? Maybe we would not achieve victory. Maybe at the end of the battle both *Sultanhisar* and *AE2* would be destroyed and sunk down the blue waters of Marmara. Still, we would ram! The only solution, the one that could take us either to victory or to death, was this.

I was going to attack *AE2* on its weakest point, on the back rudders, thus preventing it from submerging. I turned *Sultanhisar* around. I gathered speed like an athlete getting ready for long distance sprints. The clock read exactly ten to eleven. We were going onto the submarine at full speed. By a 10-degree turn I turned the front of the ship towards the rudders. It began dipping its bow into the water. We continued on our way with speed. The bow of *Sultanhisar* rammed on the tip of the starboard hydroplane.

### **Comment**

It seems that *AE2* had avoided being rammed at the last minute by chance as during the 2007 Expedition Diving on *AE2* revealed no damage to the starboard hydroplane.

## **6.5. Duration of the Struggle**

### **Stoker's Recollections**

In his memoirs, Stoker writes as if the events on that fateful morning happened rather quickly and in succession of diving, rising, trying to dive again etc. One gets the feeling that it all happened very quickly.

### **Ali Rıza's Recollections**

In his memoirs, Ali Rıza on the other hand, seems to extend the time of the struggle to a few hours, including chasing the submarine in the Sea of Marmara. Towards the end of the struggle Ali Rıza says "The sun had risen right above us." indicating mid-day. If the encounter started around 10 am, the time of the *AE2* with the *E14*, then it is likely that the struggle could have lasted around two hours. This length of time would allow either of the vessels to use their torpedoes. This might provide a clue to the last torpedo on *AE2* being employed unsuccessfully.

## **6.6. Sinking of AE2**

### **Stoker's Recollections**

"... the Turkish gunboat *Sultanhisar* had struck the engine room with three 37 mm shells from a deck gun. "BANG... *A cloud of smoke in the engine room. We were hit and holed!*" Any future attempts to dive were fruitless as water poured in through these

openings. Finished! We were caught! We could no longer dive and our defence was gone. It but remained to avoid useless sacrifice of life. All hands were ordered on deck and overboard. While the crew scrambled up on the deck, an officer remained with me below to take the necessary steps for sinking [i.e. scuttling].

What a sight! Pandemonium—I cannot attempt to describe it—food, clothing, floatsom and jetsam of the weirdest sorts floating up on the fast entering water in the place which we had been so proud to keep neat and clean. As I reached the bridge the water was about two feet from the top of the coning tower. Perhaps a minute passed, and then, slowly and gracefully, like the lady she was, without sound or sigh, without causing an eddy or a ripple on the water, *AE2* just slid away on her last and longest dive.”

### **Ali Rıza’s Recollections**

*AE2* suddenly began emerging out of water right next to my ship. If my ship’s bow were in that direction it was certain that she would have lifted and turned us upside down. This time our lives were saved by chance. We were waiting for this emergence anxiously. Our struggle which had lasted for hours had been with a periscope. We were unaware of the size or the identity of the enemy we were faced with. This wait did not last long. The huge body of the submarine emerged right in front of us in all its glory. I read the abbreviation *AE2* at the front. Then, I realised our opponents were from the British Navy.

Then, slowly the British flag began to be raised on the submarine flag post. The soldiers who were pouring out of the tower began waving their shirts and hats. The enemies were accepting defeat. *AE2* was slowly sinking. All soldiers were jumping into the sea. There was only one officer left who I later found out was the captain.

### **Comment**

It seems that Ali Rıza did not know that one of *Sultanhisar*’s guns actually caused the sinking of *AE2* by holing it. Stoker, being down below, does not know and does not mention the raising of the flag of surrender.

## **6.7. Meeting of the Two Captains**

### **Stoker’s Recollections**

Wearing long sea-boots and a quantity of thick clothing and carrying a dispatch case in one hand, does not facilitate the business of swimming the sea. I was none too sorry when torpedo-boat’s dinghy picked me up. The man in charge of the boat spoke English and I immediately asked if his captain was German or a Turk, and was relieved to hear the latter, as I had no desire to surrender to a German. As I clambered, dripping and miserable, over the side of the little vessel the Turkish captain received me most courteously and in answer to my question took immediate steps to find out

if all my crew were saved. The answer being yes; a great relief to the mind and with that I was sent below.

### **Ali Rıza's Recollections**

*AE2* crew were all in the sea. However, this heroic officer was not leaving his ship, which was sinking into the water, and he was doing his saluting duty to his flag which was about to sink into the blue waters of Marmara. This beautiful declaration of love for one's country made all of us emotional. We all felt the same high regard for the fallen enemy, and we were saluting the sinking flag of *AE2*. My soldiers were thrilled. I gathered them on deck. I said:

- 'My sons! You have received the reward for your efforts and determination by this submarine sinking in front of you'.

- 'You have taken the revenge of the Maidos fire gallantly. However, the battle is now over. Hostility has ended here. Now, you will do your humanitarian duty. I am sure you will conduct this duty in a manner befitting the generosity of the Turkish soldier. No sword is lifted against one who asks for quarter. Let's see. Pick up the prisoners. No one will have so much as a nosebleed, no one will suffer.'

All soldiers worked hard and got the first aid procedure ready. They had stretched ropes all along the length of the ship so that the wounded and those who wanted to save themselves could hang on. We put both lifeboats into the sea. I had ordered one of the boats to go and get the commander straight away. The submarine was now totally out of sight. The commander of the ship was swimming towards *Sultanhisar*. The lifeboat picked him up from the sea and brought him over to us. He was climbing the stairs in his drenched white uniform. He looked tired and exhausted. Together with my second in charge we welcomed him at the gangway. I introduced myself.

- 'Captain Ali Rıza'. And I extended my hand. He firmly shook my hand and responded:

- 'Captain Stoker' he said.

### **Comment**

The story of the captains ends here with the sinking of *AE2* in 72 meters of water which will not be discovered until 1997.

## PROLOGUE

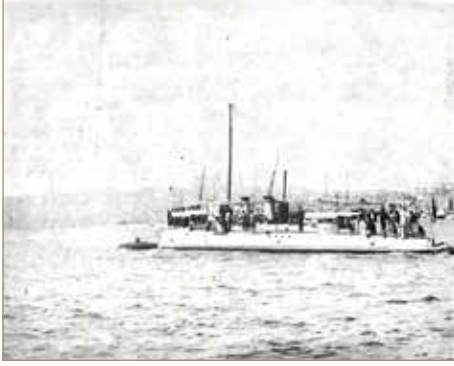
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The honourable conduct of Ali Rıza in recovering and caring for Stoker and his crew is an early illustration of the respect that now exists between Türkiye and Australia. The inability of *AE2* to sink any Turkish vessel and cause loss of life, in some ways turns out to be a good omen. Similarly, *Sultanhisar* not being able to torpedo *AE2* and cause it to sink with all hands on board also augurs well for the Turkish–Australian friendship that exists today.

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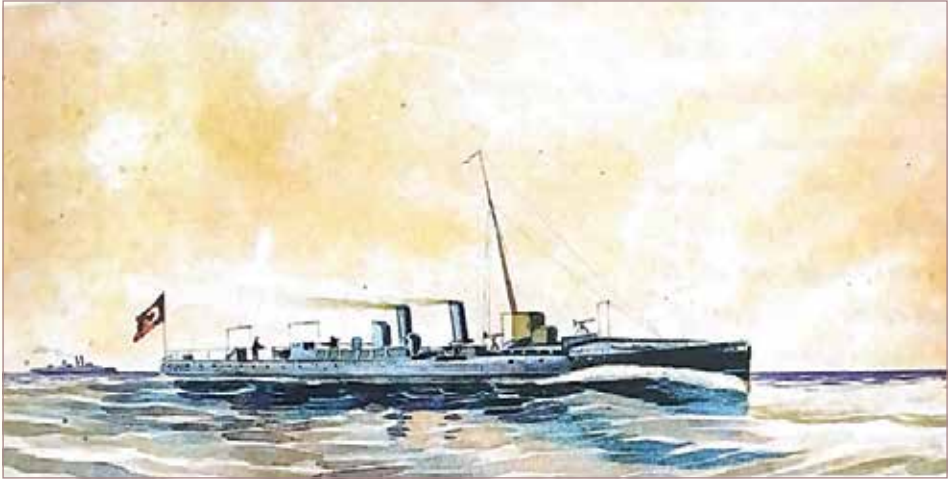
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Sultanhisar Torpedo Boat, Istanbul Naval Museum Archive (Bal 2006).

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Sultanhisar Torpedo Boat, oil painting by Hüsnü Tengüz, Istanbul Naval Museum Archive (Bal 2006).

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# AN EXAMINATION OF HMAS AE2'S TECHNICAL CHARACTERISTICS AND THEIR IMPACT ON OPERATIONS WITHIN THE CONTEXT OF SUBMARINE TECHNOLOGY DEVELOPMENTS DURING THE FIRST WORLD WAR

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## ABSTRACT

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The modern use of submarines on the battlefield first emerged during the First World War. Submarines appeared as surprise elements capable of conducting operations undetected, especially in waters under enemy control. In this regard, *AE2* stands out both for its technical features and operational performance. *AE2* played an active role in one of the most intense fronts of the First World War—the Gallipoli Campaign—and its actions had a significant impact on the course of the war. This study was prepared with the aim of identifying the technical characteristics of *AE2*. As a methodology, a literature review research approach was adopted; primary and secondary sources were examined, including historical documents, official naval records, military archive data, scientific articles, and field reports. The study first briefly outlines the operational history of *AE2*. In subsequent sections, the evolution of submarine technology up to the design of *AE2* is discussed on a class-by-class basis, followed by a detailed overview of its technical specifications and an evaluation of their impact on submarine operations.

## Keywords

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*AE2*, Submarine, Gallipoli, Submarine Technology

## OPERATIONAL HISTORY

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**A** *AE1* and *AE2* were E-class submarines built in Barrow, England, for Australia. Because they were constructed specifically for Australia, the letter “A” was added before “E” in their class designation, forming the name “AE” (White 2015). Both submarines were commissioned into the Australian Navy as its first submarines on 28 February 1914 in Portsmouth, England.

On 2 March 1914, they departed Portsmouth with mixed British and Australian crews bound for Sydney. During their voyage, they experienced various mechanical failures and maintenance issues but eventually arrived in Sydney on 24 May 1914, about three months before the outbreak of the First World War. The journey lasted 83 days and covered over 11,000 nautical miles, a record distance for a submarine at that time (Seal 2013).

When the First World War began, *AE1* and *AE2* joined the Australian Navy’s operations to seize German colonies in New Guinea. During this mission, *AE1* was lost on 14 September 1914 with all crew on board, just seven months after commissioning. Its wreck was discovered in 2017 at a depth of 300 meters in the Bismarck Sea (ABC NEWS 2017).

*AE2* continued operations in the region for some time before returning to Sydney on 16 November 1914. After a brief maintenance period, she departed Sydney and, by February 1915, arrived at Bozcaada to support the Gallipoli campaign.

Initially, *AE2* saw little action in the early stages of the Gallipoli campaign. This changed when its commander, Lieutenant Commander Henry Hugh Gordon Dacre Stoker, proposed a plan to penetrate the Sea of Marmara, which was approved by Admiral De Robeck, Commander of the British Eastern Mediterranean Fleet. The aim of this operation was to disrupt the transport of troops and supplies to Turkish forces at the Gallipoli front via sea routes (Holland 2007).

*AE2* made its first attempt on 24 April 1915, but due to a malfunction, it had to return to Bozcaada. After repairs, it attempted again on 25 April 1915, the same day Allied forces landed at Gallipoli peninsula. Despite being detected at times by coastal batteries and subjected to gunfire and patrol searches, the submarine managed to successfully breach the Çanakkale Strait and enter the Sea of Marmara around 9.00 pm on 25 April 1915.

## OPERATIONS IN THE SEA OF MARMARA

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In the Sea of Marmara, *AE2* encountered several transport and combat vessels, launching a number of attacks; however, these did not achieve any confirmed successes. On 30 April 1915, while evading the Turkish torpedo boat *Sultanhisar*, *AE2* unexpectedly surfaced—likely due to the oceanographic and hydrographic conditions of the Sea of

Marmara affecting her buoyancy and depth control systems. Exposed to heavy gunfire from *Sultanhisar*, she sustained hits that rendered her incapable of diving. Consequently, the crew scuttled the submarine off Karabiga, in the Sea of Marmara.

All crew members were rescued by *Sultanhisar*, but four later died in prisoner of war camps. The remaining survivors were released and repatriated after the war. The wreck of *AE2* was discovered in 1998 at a depth of 73 meters (Smith and Özdağ 2015).

Although *AE2* failed to completely block the sea-based logistics of the Turkish forces at Gallipoli, its mission had significant strategic and psychological effects. Firstly, as the first Allied submarine to successfully enter the Sea of Marmara, *AE2* proved that the operation was feasible. Following her example, more Allied submarines infiltrated the Sea of Marmara and inflicted substantial damage on Turkish sea transport and supply lines.

Another notable consequence was its potential impact on the prolongation of the Gallipoli land campaign. On 25 April 1915, the same day Allied troops began landing at Gallipoli, *AE2* reported via wireless that she had breached the Çanakkale Strait and entered the Sea of Marmara.

At that time, radio transmission ranges were limited to 30–100 miles, so the destroyer HMS *Jed* was stationed in the Gulf of Saros to relay *AE2*'s messages. Although *AE2* did not receive a response and was uncertain whether her signal had reached headquarters, the message was successfully received by General Ian Hamilton aboard HMS *Queen Elizabeth*.

Hamilton was, at that moment, considering the withdrawal of ANZAC forces from Anzac Cove, who were under heavy counterattack from Turkish forces led by Lieutenant Colonel Mustafa Kemal (Atatürk). The *AE2*'s report boosted morale at Allied headquarters, leading Hamilton to order the troops to hold their positions. This decision may have contributed to the prolongation of the Gallipoli campaign (DVA 2024).

*“Your news is indeed serious. But there is nothing else to be done; dig yourselves right in and stick it out. It would take at least two days to withdraw you. Meanwhile, the Australian submarine has got through the Narrows and torpedoed a gunboat. Hunter-Weston will be attacking again tomorrow despite his heavy losses, which may ease your pressure. Make a personal appeal to your men to make an extraordinary effort to hold their ground.”*

*Note: You have got through the difficult part—now just dig, dig, dig—until you are safe.”*

It has been suggested that Hamilton's repeated phrase “dig, dig, dig” inspired the term “Digger”, later adopted as a nickname for ANZAC soldiers (Jarrett 2000).

## DEVELOPMENT OF SUBMARINE DESIGN AND CONSTRUCTION IN THE BRITISH NAVY DURING THE FIRST WORLD WAR

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Until the early 20th century, Britain did not actively encourage the development of submarines, as they were regarded as a potential threat to the British Navy's supremacy in surface warships. Submarines were considered weapons for nations on the defensive—vessels of the poorer or weaker navies. This prevailing attitude was perhaps best expressed by Admiral of the Fleet Sir Arthur Wilson, VC, the Controller of the British Navy, who in 1901 denounced submarines as “*underhand, unfair and un-English,*” and went so far as to suggest that submariners should be treated as pirates and hanged if captured (Preston 1998).

*“Submarines are underhand, unfair, and damned un-English. Treat all submarines as pirates in wartime ... and hang all crews.”*

Although it may seem unrelated, the British Navy was in fact making its plans. During this period, France as the continental power across the English Channel was regarded as the principal threat to the Britain. The British Navy's surface fleet followed traditional strategic plans aimed at blockading France's Atlantic and Mediterranean ports and naval bases. In response, France was developing submarines, and Britain was closely monitoring these advancements.

In 1899, the French successfully conducted a torpedo attack trial using a submarine against a surface vessel, an event that drew significant attention in Britain. The deployment of French submarines in their coastal bases and ports posed a potential danger to the British blockading forces. Consequently, the British Navy recognized the necessity of acquiring submarines—both to develop countermeasures against enemy submarines and to defend British ports in the event of a blockade.

The first British submarines were primarily constructed for experimental purposes and for harbour defence. This process began with the Holland-class boats and soon expanded to include the A, B, C, and D classes, eventually leading to the E-class submarines, among which was *AE2*. Since the focus of this study is *AE2*, submarine classes developed after the E-class are not addressed in this section.

### HOLLAND-CLASS SUBMARINES (1901–1903)

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At the outset, the British Navy decided that it would be quicker to obtain an existing submarine design rather than develop one of its own, and for this purpose, they made contact with the United States. The shipbuilding company Vickers, Sons and Maxim, based in Barrow-in-Furness, acquired the patents for the Holland-class subma-

rines. Between 1901 and 1903, five Holland-class submarines were constructed at Barrow. These were single-hull designs (Metcalf 2024).

Surface displacement: 104 tons  
Length: 63.75 ft (~ 20 meters)  
Surface propulsion: Single screw, one gasoline engine (160 HP), providing 8 knots surface speed  
Submerged propulsion: 74 HP electric motor powered by batteries, giving 5 knots submerged speed  
Range: 250 nautical miles  
Armament: One 18-inch torpedo tube in the bow  
Crew: 7, with no accommodation

Although the early experiences with the Holland-class submarines revealed their limitations—such as short range and very low freeboard that restricted their surface operations to calm seas—they proved effective in harbour defence and demonstrated that submarines could pose a significant threat to surface vessels attempting to blockade ports at close range. As a result of these evaluations, submarines were permanently incorporated into the inventory of the British Navy, and new submarine designs were developed to overcome the limitations of the Holland-class.

The Holland-class submarines were used for testing and harbour defence duties. All five of them were decommissioned by 1914.

## **A-CLASS SUBMARINES (1902–1905)**

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The A-class submarines, developed as a continuation of the original Holland-type design, were intended to address some of the shortcomings of their predecessors. They were single-hull and larger than Holland-class, with an average length of 30 meters. A total of thirteen submarines were built between 1902 and 1905.

With the exception of the experimental *A13*, which was fitted with a diesel engine, all A-class submarines used gasoline engines for surface propulsion and battery power when submerged. The *A1* carried a single 18-inch torpedo tube with three torpedoes, while the later A-class boats were equipped with two tubes and carried four torpedoes (Gardiner and Gray 1985).

Surface displacement: 165 tons  
Length: 100 feet (~30 meters)  
Surface propulsion: Single screw, one 500 HP gasoline engine, with a surface speed of 11 knots

Submerged propulsion: Battery-powered single electric motor of 150 HP, with a submerged speed of 7 knots

Range: 400 nautical miles

Armament: *A1* had one 18-inch torpedo tube in the bow; the remaining boats were fitted with two

Crew: 14, no accommodation

A conning tower (sail) was added, which made surface navigation easier and improved visibility while operating on the surface.

The A-class submarines experienced frequent technical and operational problems, including fatal accidents, though many still saw active service during the First World War, primarily in harbour defence roles.

## **B-CLASS SUBMARINES (1904–1906)**

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The B-class submarines were developed to strengthen Britain's submarine force in response to idea of a possible invasion prior to the First World War. Their intended role was to intercept approaching invasion forces and troop-carrying ships, using submarines and torpedo boats as part of a coastal defence strategy under the protection of battleships. Their design was still fundamentally based on the Holland-class, and they were single-hull.

The B-class retained the same propulsion concept as the A-class—gasoline engines on the surface and batteries underwater—but were larger and more seaworthy. They were designed to overcome the limited endurance of earlier models. The major improvement was the addition of two sets of hydroplanes (horizontal rudders)—one at the stern and one at the bow—greatly improving depth control. Another innovation was the introduction of a deck platform, making it easier for crew members to move topside (Gardiner and Gray 1985).

B-class submarines had two bow torpedo tubes and two spare torpedoes, but due to weight balancing constraints, spare torpedoes could only be loaded if an equivalent weight of fuel was offloaded.

Surface displacement: 280 tons

Length: 135 feet (~ 41 meters)

Surface propulsion: Single screw, one 600 HP gasoline engine, providing a surface speed of 13 knots

Submerged propulsion: Battery-powered 150 HP electric motor, with a submerged speed of 8 knots

Range: 1,000 nautical miles

Armament: Two 18-inch torpedo tubes in the bow  
Crew: 16, no accommodation

A total of 11 B-class submarines were built, serving during the First World War, but were retired before the war ended due to technical limitations (Wilson 1981).

### **C-CLASS SUBMARINES (1906–1910)**

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The C-class submarines were an improved version of the earlier A and B classes, incorporating lessons learned from their operational experience. A total of 38 units were built between 1906 and 1910. They were developed not only to strengthen coastal defence capabilities but also to gain experience and conduct extensive testing before the introduction of the longer-range D-class submarines, which were intended for operations beyond coastal defence. Although developed for coastal defence, they later performed longer-range missions during the First World War (Friedman 1984).

Like the previous classes, they were based on the Holland design and were single-hull design. Their characteristics were similar to those of the B-class, but they featured stronger electric motors, giving them a higher maximum submerged speed (8 knots). They also had a better trim system and enhanced hydrodynamic form, allowing improved underwater control. In addition, the increased fuel capacity extended their operational range.

Surface displacement: 290 tons

Length: 135 ft (~ 41 meters)

Surface propulsion: single screw, single 600 HP gasoline engine providing a surface speed of 13 knots

Submerged propulsion: battery-powered 200 HP electric motor providing a submerged speed of 8 knots

Range: 1,500 nautical miles

Armament: two 18-inch torpedo tubes on the bow

Crew: 16, no accommodation

Another notable innovation was the introduction of an emergency escape system, implemented for the first time in this class. The system consisted of three interconnected compartments with a fourth compartment on the starboard side, allowing crew members to exit through the torpedo hatch. Each compartment was equipped with diving helmets for the entire crew, and the system was later retrofitted to B- and C-class submarines (Harrison 1979a).

## D-CLASS SUBMARINES (1907–1910)

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As the First World War approached, it became evident that, contrary to earlier assumptions, the main threat would come not from France but from Germany. This situation placed the eastern coasts of Britain under the potential threat of the German Navy. The British had previously planned to blockade German ports and naval bases with surface forces. However, the powerful German fleet and its torpedo crafts could inflict serious damage on the blockading units. Moreover, the existing British naval bases were too distant to effectively protect the eastern shores. Therefore, there was a growing need for assets capable of maintaining a blockade on German ports and bases without sustaining damage, while also providing sufficient early warning allowing the British fleet take a position on time when German naval forces attempted to sortie from their bases. The D-class, constructed between 1907 and 1910, represented the first generation of British submarines specifically designed for long-range patrol missions and offensive operations against surface ships, rather than mere coastal defence (Gardiner and Gray 1985).

They introduced several major design innovations and were built under strict secrecy, with construction carried out in covered docks to maintain confidentiality.

One of the most important advancements was the introduction of twin-shaft propulsion, whereas all previous classes had single-shaft drive. This significantly improved manoeuvrability (Gardiner and Gray 1985).

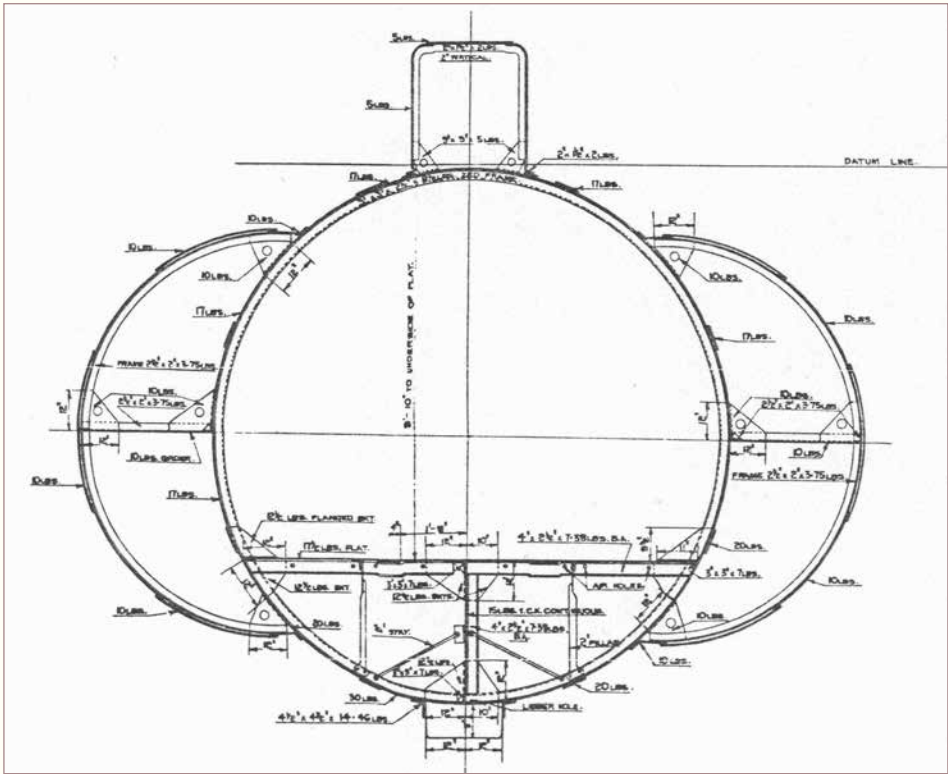
Another notable improvement was a larger conning tower (sail), providing a better vantage point for surface navigation and giving the D-class submarines a more modern appearance.

Perhaps the most significant structural innovation was the introduction of saddle-type ballast tanks, located outside the pressure hull on both port and starboard sides (Harrison 1979b). In earlier single-hull classes, ballast tanks were placed inside the pressure hull, limiting internal space. The D-class relocation of ballast tanks increased internal volume for living and operational space—a design still used in many modern submarines. Fig. 1 shows a cross-section of the D-class submarines amidships, including the saddle-type ballast tanks.

Armament improvements included two bow torpedo tubes and one stern tube (Dash 1990), enabling rearward torpedo firing for the first time. This was advantageous when evading pursuing ships, as a torpedo could be launched while retreating. One spare torpedo was carried for each tube, totalling six torpedoes.

From a propulsion perspective, the D-class submarines were the first British submarines to use diesel engines, replacing the more dangerous gasoline engines of earlier models. The higher flash point of diesel fuel greatly reduced the risk of onboard fires and toxic vapours, improving both safety and crew health (Gardiner and Gray 1985).

The D-class also introduced a deck-mounted gun, typically a 12-pounder, placed ahead of the sail for surface combat (Dash 1990).



**Figure 1.** Cross-section of saddle-type ballast tanks (Retrieved from RN Subs. [https://rnsubs.co.uk/index.php?PageID=973#prettyPhoto\[x\]/9/](https://rnsubs.co.uk/index.php?PageID=973#prettyPhoto[x]/9/))

Additionally, they were the first British submarines fitted with wireless telegraph transmitters (earlier boats had only receivers). The antenna was mounted on the mast and had to be removed before diving, meaning transmissions could only occur while surfaced.

Surface displacement: 483 tons

Length: 163 ft (~50 meters)

Surface propulsion: twin screws, two diesel engines, total output of 1,750 HP, surface speed of 14 knots.

Submerged propulsion: battery-powered electric motors of 550 HP, enabling a submerged speed of 10 knots.

Range: 2,500 nautical miles at a speed of 10 knots.

Armament: Three 18-inch torpedo tubes (two in the bow, one in the stern), six torpedoes, one 12-pounder deck gun.

Crew: 25

Although moving the ballast tanks outside the hull and extending the length created more internal space, the addition of extra diesel engine, a stern torpedo tube, and other equipment still left little room for improving crew accommodation.

The D-class submarines saw active service in British coastal waters during the First World War. The final two units of this class were developed further and became the prototype for the E-class.

## E-CLASS SUBMARINES (1911–1917)

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Between 1911 and 1917, a total of 56 E-class submarines were constructed in various shipyards across Britain. These submarines represented the backbone of the British Navy's submarine fleet during the First World War. The British E-class submarines represented the culmination of a continuous design evolution that began in 1902 with the A-class, followed by the B, C, and D classes. Each successive class incorporated the operational and technical experiences gained from its predecessors, resulting in improved capabilities. By the time the E-class submarines were introduced, they represented the most advanced British submarine design of their era, later succeeded by the L-class.

The E-class submarines were built in three groups, each with certain differences. The first group, consisting of *E1* to *E8*. Group 2 comprised submarines from *E9* to *E20*, while Group 3 included those from *E21* to *E56*. The E-class maintained several D-class features—including twin propellers, diesel engines, and saddle tanks—but were larger, more powerful, and more seaworthy.

Length: 54–55 meters

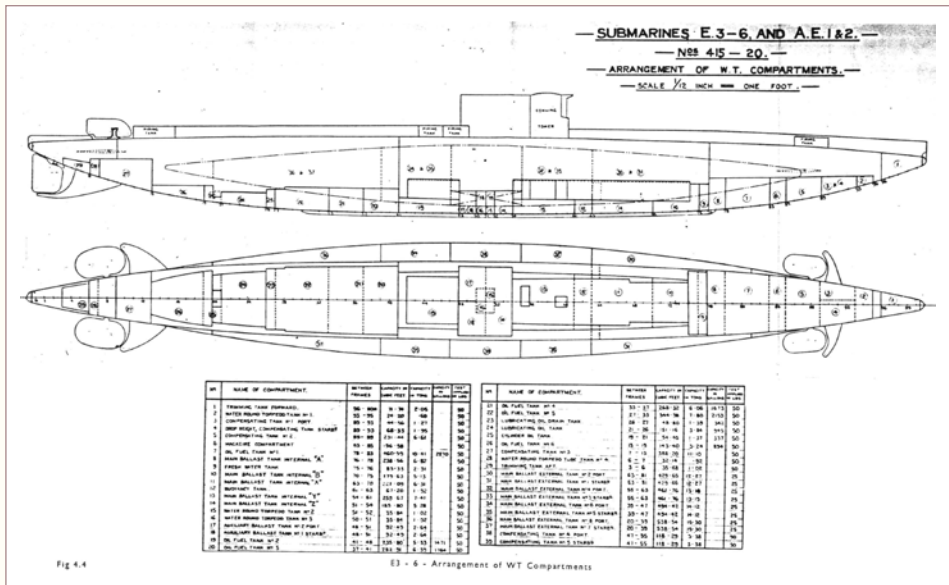
Displacement (submerged): approximately 800 tons

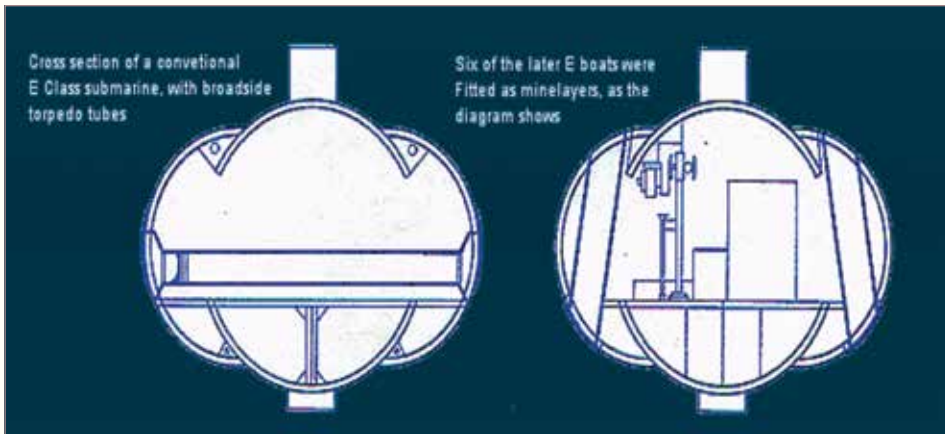
Propulsion: Two 800 HP Vickers diesel engines and two electric motors (600 HP in *E1–E8*, 840 HP in others)

Speed: 15 knots on the surface, 10 knots submerged

Another major innovation was the use of watertight bulkheads, dividing the submarine into multiple pressure-resistant compartments (Dash 1990). This significantly increased survivability and allowed for safe diving to 100 feet (~30 meters)—though some E-class boats exceeded that depth during wartime operations. Fig. 2 below shows the compartment configuration of the E-class submarines *E3–E6*, *AE1* and *AE2*.

E-class submarines were also the first to feature beam-mounted torpedo tubes—two tubes placed perpendicular to the main axis of the hull, one on each side. These side-firing torpedo tubes passed through the saddle ballast tanks. This design allowed submarines to fire without having to turn directly towards their targets, reducing the risk of collision and improving attack flexibility (Gardiner and Gray 1985).





**Figure 3.** E-Class Submarine Side Torpedo and Mine Tubes.  
(retrieved from RN Subs <https://rnsubs.co.uk/index.php?PageID=219>)

The submarines *AE1* and *AE2*, built for the Australian Navy, were constructed in accordance with the Group 1 configuration of the E-class submarines.

## TECHNICAL CHARACTERISTICS OF AE2

*AE2* was constructed at Vickers Ltd. Shipyard, Barrow-in-Furness, England, as one of the British E-class submarines. As discussed in earlier sections, the E-class represented the culmination of technological advances that began with the A-class and continued through to the D-class submarines. *AE2* embodied many of the cutting-edge design features of its time. Table 1 presents a comparative summary of the First World War British submarine classes and their innovations.

### Dimensional Characteristics

- Length: 181 ft (~55 m)
- Beam: 22 ft 6.5 in (~6.86 m)
- Height: 16 ft 0.75 in (~4.89 m)
- Draft: 12 ft 6.5 in (~3.81 m)
- Freeboard (to conning tower): 12 ft
- Displacement:

There is some variation among sources:

- o Most list 664 tons (surfaced) and 780 tons (submerged).
- o One source (SEA POWER CENTRE) cites 599 tons (surfaced) and 726 tons (submerged).

Class	Years Built	Hull Type	Surface Displacement	Length	Propulsion (Surface / Submerged)	Speed (Surface / Submerged)	Range (nm)	Armament	Crew	Notable Features / Innovations
Holland	1901-1903	Single hulled	104	63.7 ft ~20m	1 x 160 HP gasoline engine / 1 x 74 HP electric motor	8 / 5	250	1 x 18-inch bow torpedo tube	7	First British submarines; used for trials and harbour defense
A-Class	1901-1905	Single hulled	165	100 ft ~30m	1 x 500 HP gasoline engine / 1 x 150 HP electric motor	11 / 7 knots	400	A1: 1 x bow tube, others: 2 x 18-inch bow tubes	14	Added conning tower; improved surface navigation
B-Class	1904-1906	Single hulled	280	135 ft ~41m	1 x 600 HP gasoline engine / 1 x 150 HP electric motor	13 / 8 knots	1,000	2 x 18-inch bow tubes	16	Added hydroplane; larger, more seaworthy; deck platform
C-Class	1906-1910	Single hulled	290	135 ft ~41m	1 x 600 HP gasoline engine / 1 x 200 HP electric motor	13 / 8 knots	1,500	2 x 18-inch bow tubes	16	Improved trim, hydrodynamics, and escape system
D-Class	1907-1910	Saddle-tank (semi-double)	483	163 ft ~50m	2 x diesel engines (1,750 HP total) / 550 HP electric motors	14 / 10 knots	2,500 @10 knots	3 x 18-inch tubes (2 bow, 1 stern), 1 x 12-pounder deck gun	25	First twin-screw, diesel-powered; external ballast tanks; wireless telegraph
E-Class	1911-1917	Saddle-tank, water-tight bulkheads	662-807	181 ft ~5m	2 x Vickers diesels (1,600 HP total) / 2 x electric motors (600 HP each)	15 / 10 knots	3,000 @10 knots	E1-E8; 4 X 18 inch tubes (1 bow, 2 beam, 1 stern), Others; 5 x 18-inch tubes (2 bow, 2 beam, 1 stern), 1 x deck gun, some with mines	30 to 35	Side-firing torpedo tubes, stronger radio, depth sounder, improved survivability

**Table 1.** British WWI Submarine Classes Comparison.

- o Barrow's shipyard records indicate that early E-class submarines displaced 652 tons (surfaced) and 795 tons (submerged), while later ones displaced 662 and 807 tons respectively (Akermann 2002).

*AE1* and *AE2* were built between these two production groups, giving *AE2* an estimated displacement of 599–662 tons surfaced, 726–807 tons submerged, and a reserve buoyancy of 127–145 tons.

## Propulsion and Power System

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- Surface propulsion: 2 x 8-cylinder Vickers diesel engines, total power output 1,600 HP
- Submerged propulsion: 2 x electric motors powered by two 112-cell lead-acid batteries, total power 840 HP
- Propellers: 2 (twin-screw configuration)

## Speed and Endurance

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- Surface speed: 15.25 knots
- Surface range: 3,000 nautical miles at 10 knots
- Submerged speed: 10 knots for 1 hour 30 minutes
- Submerged endurance: 99 nautical miles at 3 knots

## Diving Depth

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- Test depth (E-class standard): 100 ft (~30 m)
- Operational maximum depth (*AE2*): 200 ft (~61 m)
  - The *AE2*'s maximum depth was increased through the addition of watertight bulkheads.
  - Official records mention that *AE2* dived to depth of 90 ft (~27.5 m). Commander LCDR H. Stoker reported encountering a strong reverse current in the Çanakkale at this depth. In another report dated 30 April 1915, Stoker noted that *AE2* was equipped with only a 100-ft depth gauge, suggesting that although structurally capable of diving deeper, the safety limit was set at 100 ft. Despite exceeding this limit during a rapid uncontrolled dive on 30 April 1915, the submarine's hull integrity remained intact (Smythe 1977).

*“Dived to avoid a torpedo boat; while submerged, sighted smoke in Artaki Bay and turned south to investigate. Around 10.30, the boat’s bow suddenly rose (due to a strong underwater current), and she broke surface less than a mile from the torpedo boat. Under heavy fire, she dived rapidly beyond the 100-foot mark—AE2 was only fitted with a 100-foot depth gauge. After considerable descent, the boat rose quickly past the 100-foot mark and broke surface bow-first...”*

## Armament

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- Torpedo Tubes: 4 × 18-inch (457 mm) tubes
  - One forward (bow)
  - One aft (stern)
  - Two beam tubes (one on each side—port and starboard)
- Torpedo Load: 8 torpedoes total (1 for each tube + 1 spare per tube)
- Torpedo Type: Whitehead Mk VIII
  - Speed: 35 knots
  - Range: 2,500 yards
  - Warhead: 320 lb (145 kg) TNT
- Deck Gun: *AE2* carried no deck gun.

## Navigation and Communications

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- Wireless system: Marconi Mk 10 transmitter/receiver
- Gyro compass: Sperry Gyro Compass
- Periscopes: Optical periscopes connected to the control tower for visual navigation and targeting

## Crew Composition

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- Total complement: 32 personnel
  - 3 officers
  - 29 ratings
- Crew origin: Mixed personnel from the Australian Navy and the British Navy.

## EVALUATION OF THE OPERATIONAL IMPACT OF AE2'S TECHNICAL CHARACTERISTICS

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When analysed in conjunction with its operational history, several of *AE2*'s technical characteristics stand out as particularly influential:

### 1. Long-range endurance

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The E-class, like the D-class before it, was significantly larger and designed for extended missions. Earlier submarine classes were primarily intended for coastal defence,

whereas the E-class could undertake long-range deployments. *AE2*'s voyages from England to Australia, and later from Australia to Gallipoli, demonstrate its exceptional endurance and range, despite some technical difficulties encountered en route.

During their first surface navigation trial in 1903, three of the five Holland-class submarines broke down for various reasons within the first four miles, and none succeeded in completing the planned circumnavigation of the Isle of Wight (approximately 55–60 nautical miles) (Bacon 1940). Only eleven years later, despite some mechanical issues and being towed for part of the voyage, *AE1* and *AE2* covered a distance of over 11,000 nautical miles from Portsmouth to Sydney via Suez Canal route, demonstrating the remarkable progress submarines had achieved. The towing during part of the journey was not due to breakdowns, but rather to avoid shortening the service life of the engines.

## 2. Improved diving capability

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The addition of reinforced bulkheads allowed for deeper dives, increasing the test depth from 100 ft to 200 ft. This proved advantageous during operations in the Çanakkale Strait, where *AE2* reached 90 ft and even descended uncontrollably beyond 100 ft without sustaining hull damage—a testament to its structural resilience.

Until the end of the First World War, there was no practical means of detecting submarines while submerged. Submarine diving depths were therefore determined primarily by two considerations: the need to pass safely beneath the keels of large ships, and the ability to rest on the seabed to conserve battery capacity. A diving depth of 100 feet was considered sufficient for these purposes, and it was generally believed that no submarine would deliberately descend below this limit (Brown 1987). However, operational experience soon proved this assumption to be incorrect.

Stoker records in his memoirs that during the Çanakkale operation the *AE2* dived to 70–80 feet to pass beneath the minefields, and while resting on the bottom, it occasionally slid down to depths exceeding 100 feet. On 30 April 1915, during the encounter with the Turkish torpedo boat *Sultanhisar*, *AE2* twice lost depth control and descended well below 100 feet (Stoker 1925a).

The *AE2* was fitted with a depth gauge that registered only up to 100 feet. When the submarine lost depth control on 30 April and descended beyond the 100 ft limit, the commanding officer could not determine how far the vessel had actually dived. Fearing that the hull might collapse under water pressure, he ordered the ballast tanks to be blown. The submarine rapidly became buoyant, broke the surface directly in front of *Sultanhisar*, and sustained gunfire damage that disabled its ability to dive, forcing the crew to scuttle the vessel.

In fact, *AE2* had been designed with additional bulkheads that theoretically increased its test depth to 200 feet, but this could not be verified by actual trials and thus

the official test depth remained 100 feet (Harrison 1979c). However, if, in accordance with the calculations, it had been applied beyond the 100-foot depth and a suitable depth gauge had been fitted, the commanding officer would have had more time to regain depth control and make more deliberate adjustments to the ballast tanks and the submarine's trim.

### 3. Speed performance and battery endurance

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With surface and submerged speeds of approximately 15 and 10 knots, *AE2* represented a significant advancement for its time. However, in regions such as the Çanakkale Strait, where strong currents prevailed, the submarine's underwater speed was sometimes insufficient for effective evasion or tactical positioning.

Overall, *AE2*'s surface speed was adequate for the transit of the Çanakkale Strait and subsequent operations in the Sea of Marmara. Nevertheless, slow torpedo reloading and limited capabilities for surface engagement constrained operational flexibility, making stealth the submarine's primary tactical advantage. Stoker's memoirs further indicate his desire for additional armament, such as a deck gun, to compensate for the limitations in relative speed and manoeuvrability against faster surface vessels (Stoker 1925b).

Battery capacity imposed a major constraint on submerged endurance. *AE2* frequently had to surface to recharge, exposing herself to Turkish naval patrols. Stoker notes that these patrols were very active, forcing the submarine to remain submerged for extended periods with minimal battery reserves. During the Çanakkale Strait transit, *AE2*'s maximum submerged range was given as 50 nautical miles (Stoker 1925c). By comparison, E-class submarines are reported elsewhere to achieve up to 99 nautical miles at 3 knots submerged. It appears that Stoker planned the transit at an estimated submerged speed of 5–7 knots, taking into account opposing currents.

During the transit, *AE2* remained submerged for more than sixteen hours, traveling on the surface at night towards the Soğanlıdere area and diving just before reaching the minefields to conserve battery power. A significant portion of submerged time was spent resting on the seabed. These measures demonstrate that the submarine's successful passage depended less on exceptional speed or battery capacity and more on careful planning, navigation, and tactical prudence.

### 4. Torpedo arrangement

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The presence of bow, stern, and beam torpedo tubes gave *AE2* significant tactical flexibility. Earlier submarines, with bow tubes only, had to manoeuvre directly towards targets for attacks. *AE2* could fire from multiple angles, a major advantage for both offense and defence.

The hull of *AE2* was enlarged to accommodate broadside torpedo tubes. Spare torpedoes for the bow and stern tubes were stored adjacent to tubes, while two spares for the beam tubes were kept above the tubes. Warheads were stored separately, providing additional safety (Harrison 1979d).

Reloading torpedoes was a careful, time-consuming, and manual process, conducted on the surface in calm seas using handwheels, worms, and racks. Bow and stern torpedoes were slid through inner hatches of tubes, while beam tubes featured a hinged upper section to facilitate loading (Harrison 1979d).

Despite further constraining already cramped living conditions (Seal 2009), the broadside tubes proved effective during the First World War. Records indicate that *AE2* fired at least one torpedo from each tube during operations in the Çanakkale Strait and the Marmara, expending seven of eight torpedoes. Failures were primarily due to torpedo defects, such as failure to leave the tube, surfacing without functioning, or running deeper than intended.

The absence of a deck gun was a notable limitation, posing a significant disadvantage during Marmara operations. Stoker recalled that he “longed for a gun” to engage small vessels (Stoker 1925b). Lessons from these operations led to the installation of deck guns on British submarines after 1915 (Gardener 1985).

## 5. Wireless communication

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*AE2*'s two-way wireless telegraph allowed real-time communication with Allied command—a rare capability at the time. Although modern electronic warfare would later render radio transmissions dangerous, during the Gallipoli campaign, this communication provided a crucial morale boost and had a strategic effect on command decisions.

One additional point should be mentioned here. The radio transmissions sent by *AE2* to Allied headquarters may have influenced the command decisions and contributed to the continuation of the Gallipoli Campaign. However, the limitations of its radio receiver appear to have also played a role in the submarine's eventual loss.

In his memoirs, Stoker states that he was uncertain whether his messages had been received, as he never received any acknowledgement. In fact, his transmissions were received, but due to either a receiver malfunction or unfavourable propagation conditions, *AE2* was unable to receive any reply confirming this (Stoker 1925d).

On 29 April, when *AE2* encountered *E14* in the Marmara, *E14*'s commanding officer ordered Stoker that he would relay any further orders received via their own working receiver, and that the two submarines should rendezvous at the same position the following day (30 April). Stoker, who had previously intended to proceed towards Istanbul, changed his plan accordingly and remained in the vicinity for the scheduled meeting. However, when he arrived at the rendezvous point the next day, he encountered the Turkish torpedo boat *Sultanhisar* instead of *E14* (Stoker 1925e).

Therefore, it can be argued that the radio transmitter of *AE2* may have contributed to the prolongation of the Gallipoli campaign, while at the same time, the deficiency or malfunction of its receiver also indirectly contributed to the loss of the submarine.

## 6. Trim and depth control limitations

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*AE2*'s loss on 30 April 1915 was partially attributed to trim and depth-control deficiencies. While attempting to evade *Sultanbisar*, she lost depth control probably due to the unique hydrographic and salinity conditions of the Sea of Marmara, which exceeded the design parameters of her ballast-trim systems.

The Sea of Marmara presents unique and demanding conditions for submarine operations. It is a semi-enclosed sea where two distinct water systems—the low-salinity Black Sea and the dense, saline waters of the Aegean and Mediterranean — converge. The result is a complex stratification: surface waters of Black Sea origin and deep layers of Mediterranean origin, each with markedly different salinity, temperature, and oxygen levels. During the spring months, the river input from heavy rainfall increases the freshwater inflow, further amplifying these density variations and making depth control even more difficult.

Even for modern submarines, such conditions can make trim and buoyancy management extremely challenging. For *AE2*, operating in 1915 with the limited technology of her time, these hydrographic complexities likely played a decisive role in her loss. On 30 April 1915, *AE2* probably encountered one of these sharp density interfaces. The submarine had trimmed for diving in a less dense upper layer, and when she passed into a denser water mass, she suddenly became relatively lighter—losing negative buoyancy and rising unexpectedly to the surface. It should also be noted that, except for one, all eight torpedoes had been expended, and the fuel consumed by 30 April had further lightened *AE2*.

In an attempt to regain depth, the forward ballast tank was flooded, but this overcompensation made the submarine excessively bow-heavy, resulting in an uncontrollable dive. Stoker later wrote that the hydroplanes had become ineffective (Stoker 1925a). In such extreme trim angles, the submarine's entire hull begins to act as a giant hydroplane, overwhelming the control surfaces and making recovery nearly impossible.

Assuming that the speed, trim, and flooding–blowing orders were given and executed in time, *AE2*'s trim and ballast systems were not designed to handle such rapid and large density variations, and the Marmara's unique hydrographic conditions exposed this vulnerability. For the crew, this meant a constant struggle to maintain depth and stability—a battle against the physics of the sea itself.

## 7. Crew habitability

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Despite improvements in machinery and structure, living conditions aboard *AE2* remained harsh. During her voyage to Australia, extreme internal temperatures forced the crew to paint the hull white and erect canvas shades over the bridge to reflect heat while crossing the Suez Canal and the Red Sea. Prolonged missions tested both the morale and endurance of her crew.

Living space on submarines has always been cramped, and living conditions have always been restricted—this remains true even for modern submarines. The size of submarines may have increased over time; however, larger submarines generally mean a larger crew, which does not change the fundamental reality of limited living space. Developments on submarines usually focus on their operational and technical capabilities, while crew living conditions and the hardships endured are rarely addressed. However, especially in conventional submarines, crew endurance is at least as critical as torpedo load or fuel capacity in determining patrol duration.

From this perspective, it is clear that *AE2* was no different. Although there is limited recorded data on the crew's living conditions, it appears that improvements to crew comfort were kept to a minimum. It is recorded in various sources that the crew of *AE2* served under extremely hot, humid, noisy, and foul-smelling conditions (Hodges 2003; Wheat 1920). The crew lived in a very confined space, which caused the limited air to become quickly polluted when submerged (Seal 2009).

Stoker, in his memoirs, notes that fresh water was extremely limited, making washing impossible; water was used only for drinking and for the machinery. He also mentions that heat was a major problem. In part to avoid the oppressive heat on the surface, and in part to observe its effect on the boat and crew, he chose to remain submerged. The memoirs also indicate that food was scarce—fresh supplies were very limited, and the crew mostly had to rely on tinned food and ship's biscuits. The use of a stove for heating and cooking presented another problem; when submerged, lighting the stove further reduced the already scarce oxygen, making cooking almost impossible (Stoker 1925f).

It can be concluded that living conditions on board *AE2* were extremely restricted, and that the crew faced significant hardships. Technical and operational capabilities were prioritized, while crew comfort, morale, and motivation were not considered primary concerns. However, since *AE2*'s operations in the Çanakkale Strait and the Marmara lasted only about five days, much of which was spent at or near the surface, these issues did not become a critical problem. Had the mission lasted longer, the morale and motivation of the crew could have been adversely affected.

## CONCLUSION

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Technically, *AE2* was one of the most advanced submarines of its era, incorporating the latest innovations in design and engineering. Her voyage from England to Australia, covering a distance of over 11,000 nautical miles, followed by her subsequent deployment from Australia to Bozcaada, was a record for submarines of the time and a testament to her endurance. Her successful submerged passage through the Çanakkale Strait demonstrated that such operations were indeed possible—an important achievement in itself. In both the Strait and the Sea of Marmara, *AE2* managed to reach favourable firing positions and carry out several torpedo attacks; although none of these proved successful, her mission cannot be regarded as a failure.

Considering that her primary objective was to infiltrate the Sea of Marmara, cause disruption, and hinder the resupply of Turkish forces at Gallipoli by sea, *AE2* achieved a significant measure of success. Once it was discovered that *AE2* had entered the Sea of Marmara, a substantial portion of the Turkish Navy was diverted to protect maritime supply routes and to strengthen defences against submarines. By demonstrating that a submerged transit through the Çanakkale Strait was possible, *AE2* paved the way for other Allied submarines, which, although unable to completely cut off sea-borne reinforcements, inflicted considerable damage and disruption on Turkish logistics.

At the same time, *AE2* revealed the technological and human limitations of early submarines: faulty torpedoes, malfunctioning wireless equipment, limited underwater speed, inadequate depth-control systems, restricted battery capacity, and harsh living conditions. These constraints ultimately contributed to her loss on 30 April 1915, following an uncontrolled surfacing while evading *Sultanhisar*.

The fate of *AE2* underscored not only the strategic potential of submarine warfare but also the considerable technical and human risks faced by the crews who undertook such pioneering missions.

## ACKNOWLEDGEMENTS

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I would like to express my sincere gratitude to all those who made it possible for me to carry out this study. It has been a source of great excitement and personal significance for me. As a retired submariner who served for more than twenty years in various deck and engineering officer positions, as a submarine commander, and as a submarine flotilla commodore in the Turkish Navy, I have always been deeply interested in submarine warfare and anti-submarine warfare operations of Gallipoli campaign. *AE2*'s remarkable voyages from Plymouth to Sydney and from Sydney to Bozcaada, as well as her daring infiltration into the Sea of Marmara during the Gallipoli campaign, have long stood out to me as remarkable examples of endurance and courage—both of the submarines of that era and of the men who sailed them.

The operations of Allied submarines in the Çanakkale Strait and the Sea of Marmara, together with the brave resistance of the Turkish Navy—whose anti-submarine capabilities were extremely limited by the technology of the time— have always been within my field of interest.

In 2010, during my tenure as Commander of the Çanakkale Strait, I had the honour of hosting the inauguration ceremony of the *AE2-SULTANHISAR* memorial—which still stands today at the Çanakkale Naval Museum—on the occasion of the visits by the Chief of the Australian Navy and the Vice Chief of the New Zealand Army.



**Figure 4.** Çanakkale Naval Museum AE2-SULTANHISAR Memorial.

I dedicate this study to the crews of *Sultanbisar* and *AE2*, who together helped shape the spirit of Çanakkale. I believe one of the finest reflections of this spirit was expressed by Lieutenant Ali Rıza Bey, the commanding officer of *Sultanbisar*. Upon observing one of the last officers to abandon *AE2* salute the submarine's ensign just before jumping into the sea, he remarked (Karaşin 2022):

*“This noble manifestation of devotion to the homeland deeply moved us all. Even in the presence of the defeated enemy, we rendered salute to the flag of the undefeated fleet as it descended beneath the waves, with the same sense of reverence and honour.”<sup>1</sup>*

1 “Vatan sevgisinin bu güzel tecellisi hepimizi mütehasis etmişti. Hepimiz mağlup düşmanın karşısında aynı hürmet hissini duyarak namağlup armadanın sulara karışan bayrağını selamlıyorduk.” (Karaşin 2022, *in Turkish*)

During the preparation of this work, ChatGPT, a tool developed by OpenAI, was used to improve readability and correct grammatical issues. The content was subsequently reviewed and edited as necessary, and full responsibility for the final version of the publication is taken by the author.

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# THE ÇANAKKALE SUBMARINE BATTLES AND THE SINKING OF THE HMAS AE2 SUBMARINE

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## ABSTRACT

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The First World War began on 28 July 1914 and ended on 11 November 1918 (Strachan 2003). At the beginning of the war, Australia sided with the Allied Powers alongside Britain and France. During this period, the British colonies on the Australian continent were directly dependent on Britain for defence. However, following the unification of the colonies in 1901 and the establishment of the Australian state (Bongiorno 2014), the acquisition of submarines became a strategic necessity for national security due to Australia's status as an island nation (Frame 2004). Accordingly, two E-class submarines were ordered from Britain in December 1910 (Stevens 2001). In line with this decision, HMAS *AE1* and HMAS *AE2* were built in Britain and incorporated into the Royal Australian Navy (Stoker 1925). Among these submarines, HMAS *AE2* took an active role in the Çanakkale submarine battles. This study examines the submarines that took part in the Çanakkale Strait Operation, with a particular focus on the sinking of HMAS *AE2* and the factors contributing to its loss.

## Keywords

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Submarine Warfare in the Çanakkale Strait, HMAS *AE2*, *Sultanhisar* Torpedo Boat, *AE2* Sinking

## THE SUBMARINE ADVENTURE IN THE ÇANAKKALE STRAIT

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**I**n land battles, the Allied Powers were fighting at Gallipoli, and their aim was to achieve a decisive victory against the Turkish forces. The main objective was to open the passage through the Strait to British, French, and Australian warships and transport ships, to intercept transport and support ships heading for the Ottoman forces, and to pave the way for Allied forces to reach Istanbul (Bal 2006; Özkorucu 2015).

During the Gallipoli Campaign, when the Allied Powers (Britain, France, and Australia) failed to achieve their objectives in land battles, they deployed their submarines to cut off Ottoman supply routes and open the road to Istanbul. In this regard, numerous submarine operations were carried out throughout 1915, particularly in an attempt to pass through the Çanakkale Strait and operate in the Sea of Marmara. However, significant successes were achieved thanks to the Ottoman defence of “coastal batteries, torpedo boats, and mine lines.” Many submarines were sunk or captured (Bal 2006; Özkorucu 2015).

### Chronological Developments

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*13 December 1914; Sinking of the Mesudiye:* The British submarine *B11* torpedoed and sank the Ottoman battleship *Mesudiye*, anchored in Sarısuğlar Bay. This event was recorded as the first major submarine success of the Allied Powers in the Çanakkale Strait (Halpern 1994).

*15 January 1915; French submarine Saphir:* The submarine *Saphir*, commanded by Captain Henri Fournier, attempted to pass through the Çanakkale Strait but was sunk off Cape Nara due to the intervention of Ottoman patrol vessels (*Saphir* 1908; Masson 1981).

*17 April 1915; British submarine E15:* The *E15* ran aground off Kepez under fire from shore batteries and was later destroyed by British steamboats on 19 April to prevent it from falling into Turkish hands (Halpern 1994).

*30 April 1915; Sinking of HMAS AE2:* After harassing Ottoman supply lines in the Sea of Marmara for four days, HMAS *AE2* was spotted by the Ottoman torpedo boat *Sultanhisar*. Shortly after a skirmish, she was sunk and her crew taken prisoner (Navy.gov.au. 2020; Thomazi 1997). The sinking process is discussed in detail below.

*May–December 1915; British submarine E11:* Commanded by Martin Nasmith, *E11* targeted numerous Ottoman ships in the Sea of Marmara. On 28 May the steamer

*Bandırma* was torpedoed; on 8 August the battleship *Barbaros Hayreddin*; and on 3 December the destroyer *Yarhisar* was torpedoed (Compton-Hall 2004).

*4 September 1915; British submarine E7:* During its second attempt to enter the Sea of Marmara, *E7* became entangled in nets with its propeller and was heavily damaged by Ottoman fire. 31 of its crew surrendered (Halpern 1994).

*17 October 1915; French submarine Turquoise:* After passing through the Çanakkale Strait into the Sea of Marmara, her periscope was hit by Ottoman batteries and she ran aground near Akbaş, losing her manoeuvrability. She surrendered to Ottoman forces with 28 crew members, and the submarine was captured (Masson 1981; Turquoise 1908).

*6 November 1915; British submarine E20:* While en route to meet with the French Submarine *Turquoise* in the Sea of Marmara, she was torpedoed and sunk by the German submarine *UB-14*. Nine crew members were taken prisoner by Ottoman-German forces (Halpern 1994).

*27 January 1918; British submarine E14:* Having passed through the Çanakkale Strait in 1915 and served in the Sea of Marmara, *E14* was reassigned in 1918 but was severely damaged by Ottoman coastal artillery fire off Cape Nara and sunk off Kumkale (Compton-Hall 2004).

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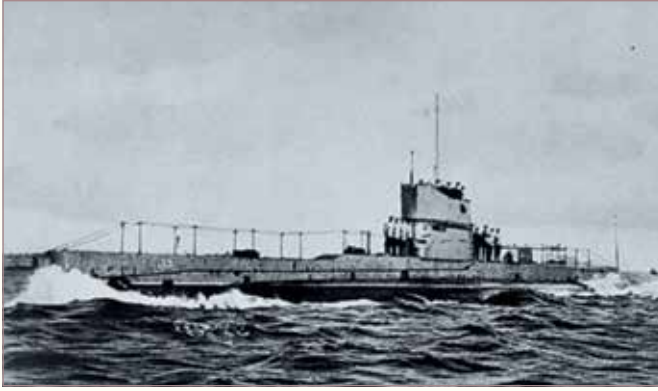
## HMAS AE2 SUBMARINE AND SULTANHISAR TORPEDO BOAT

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During the First World War, the Gallipoli Campaign drew attention not only for its land operations but also for its submarine warfare. The Ottoman Empire's coastal defences, including minefields and small torpedo boats, provided significant resistance to the superior naval power of the Allies (Arabacı and Karataş 2021). One of the most striking events of this period was the passage of a Royal Australian Navy submarine, HMAS *AE2*, through the Çanakkale Strait into the Sea of Marmara and its subsequent sinking by the Ottoman torpedo boat *Sultanhisar* (Massie 2004; Thomazi 1997).

*Technical Specifications of HMAS AE2:* HMAS *AE2* was an E-class submarine, constructed by Vickers, Sons & Maxim at the Barrow-in-Furness shipyards in England (Bastock 1975; Halpern 1994).

The *AE2* became one of the pioneering submarines of its era; its wide firing angle, achieved primarily through its side torpedo tubes, made it tactically flexible (Corbett 1920). The crew living quarters were more spacious than those of previous-generation submarines, making it suitable for long-term missions (Stoker 1925).



HMAS AE2 Submarine and Commander of the submarine Captain Stoker (Wikipedia 2025; Stoker 1925).

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*Command and Operations of HMAS AE2:* AE2 was the second submarine of the Royal Australian Navy and, after its completion in 1914, initially served along the Australian coast. With the outbreak of war, it was sent to the Gallipoli Campaign at the request of Britain (Corbett 1920). Thus, AE2, commanded by submarine captain Lieutenant Henry Hugh Gordon Dacre Stoker, became one of the few submarines capable of passing through the Çanakkale Strait (Stoker 1925).

*Technical Specifications of the Sultanhisar Torpedo Boat:* The Ottoman torpedo boat *Sultanhisar* was built in Germany in 1907 and, due to its small and agile design, was primarily used for coastal defence (Karal 1999). It was decommissioned in 1918, re-commissioned in 1924, and finally scrapped in 1935 (Sultanhisar 2025).



Sultanhisar Torpedo Boat (Kaplan 2020) and Captain Ali Rıza Bey (Karaşin 2022).

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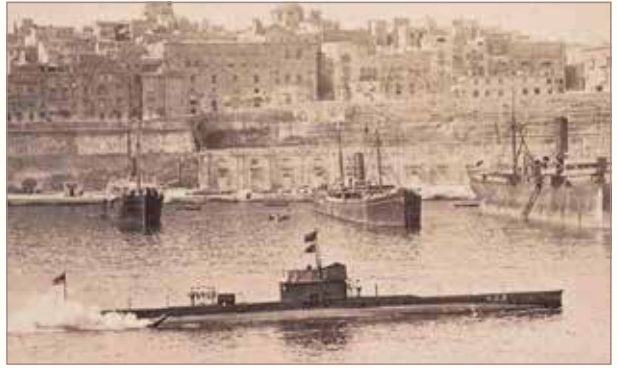
*Operational Role of Sultanhisar During the Gallipoli Campaign:* During the Gallipoli Campaign, *Sultanhisar* played an active role in patrol and reconnaissance mis-

sions, and also ensured the transportation of German General Liman von Sanders along the Gallipoli-Eceabat line (Görgülü 2020). Despite its small tonnage, *Sultanhisar* played a crucial role in securing the Straits during critical periods of the war.

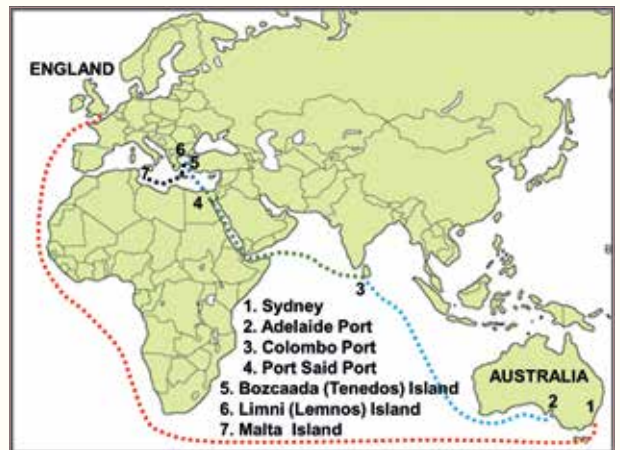
## DEPLOYMENT OF THE HMAS AE2 SUBMARINE TO ÇANAKKALE

On 28 February 1914, the HMAS *AE2*, accompanied by the HMAS *AE1* submarine, escorted a group of British and Australian ships and arrived in Australia in May 1914, first at Sydney and later at Adelaide Harbour (Halpern 1994). While in Adelaide Harbour, Australia's HMAS *AE2* submarine was reassigned to go to Çanakkale on 31 December 1914. HMAS *AE2* departed from Adelaide Harbour, Australia, to fulfil this mission and set sail for Çanakkale. The submarine first stopped at Colombo and then at Port Said, arriving at Bozcaada on 5 February 1915. The submarine then proceeded to Limni Island to establish a harbour during the war. However, the submarine ran aground while entering the port of Mondros on Limni Island and was damaged. The submarine then went to the island of Malta to have the damage repaired and, after the repair process was completed, returned to the port of Mondros on 22 June 1915, and completed the necessary preparations to join the war.

On 25 April 1915, HMAS *AE2* was tasked with passing through the Çanakkale Strait into the Sea of Marmara, neutralizing Turkish ships, and taking control of their logistical routes (Kolay et al. 2013; İşipek 2020).



HMAS AE2 in Port of Malta (Brown 2024).



HMAS AE2's Deployment Route to the Çanakkale Strait

## ENCOUNTER OF HMAS AE2 WITH SULTANHISAR AND SINKING

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On 30 April 1915, while continuing its operations in the Sea of Marmara, HMAS *AE2* was forced to surface due to a technical malfunction (Uyar 2015). At that moment, the Ottoman torpedo boat *Sultanhisar*, which was on patrol in the vicinity, detected the submarine. The torpedo boat, commanded by Captain Ali Rıza Bey, opened fire on *AE2* (Hart 2013; Stoker 1925).

*AE2* lost its manoeuvrability due to the hits it received. Commander Stoker realized that the submarine could no longer be saved and ordered the crew to abandon ship. The crew was rescued and taken prisoner by Ottoman sailors (Zürcher 2017; Stoker 1925). Shortly thereafter, *AE2* sank completely and disappeared into the depths of the Sea of Marmara (Tuna 2021). This incident was a concrete demonstration that the Ottoman Navy's small but effective units could stand up to the Allies' modern weapons.

The passing of HMAS *AE2* through the Çanakkale Strait was a significant milestone in submarine warfare. However, its presence in the Sea of Marmara lasted only four days before being neutralized by the determined Ottoman naval defences and the swift intervention of *Sultanhisar* (Sema 2025). This event is important for two reasons: First, from the Allied perspective, the submarine's arrival in the Marmara provided a temporary psychological advantage, creating the belief that the Straits could be crossed. Second, from the Ottoman perspective, the sinking constituted a strategic success: the destruction of a modern submarine by a small torpedo boat demonstrated the deterrent capacity of Ottoman defences. The fate of HMAS *AE2* thus highlights both the technological competition and the tactical dimension of submarine warfare in the Çanakkale Strait Campaign.

While crossing the Çanakkale Strait, *AE2* repeatedly descended to depths ranging from 3 to 30 meters, both to escape attacks, observe its surroundings, and recharge its batteries, and also due to cracks in its hull. Furthermore, during these ascents and descents, it repeatedly sat on the seabed and scraped against it. These developments reduced the submarine's mobility and negatively affected its ability to perform rapid manoeuvres.

## RISKS AND OBSTACLES ENCOUNTERED DURING THE PASSAGE OF THE ÇANAKKALE STRAIT

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During the First World War, Allied submarines attempting to pass through the Çanakkale Strait and enter the Sea of Marmara faced very serious obstacles. The degree to which each submarine was affected by these hazards varied, and HMAS *AE2* may have been simultaneously impacted by several of them. Additionally, battle damage sus-

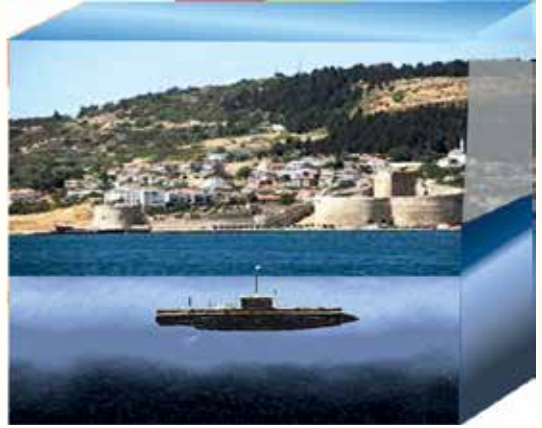
tained during its engagement with the torpedo boat *Sultanhisar* was among the key contributing factors to its loss.

Initially, the principal objective of submarine operations was to attack Ottoman vessels located in the inner sections of the Strait and to cut the logistical and transport routes supporting the Gallipoli front. Since Ottoman warships were positioned north of Cape Nara and logistical support came from the Sea of Marmara, Allied strategies focused on entering this inland sea. The main risks faced by Allied submarines during the passage were as follows:

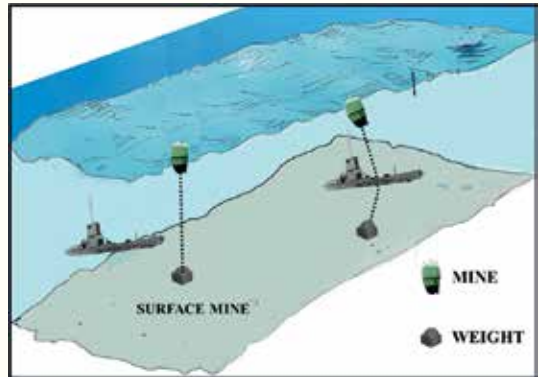
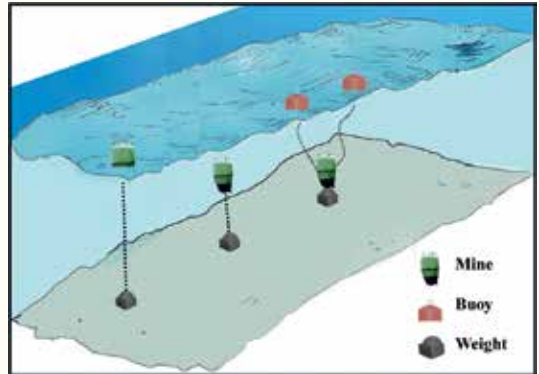
*Navigational Dependence on Compass:* As the majority of the Strait had to be traversed submerged, navigation relied primarily on compass calculations. The periscope could only be used for short observations, but surfacing even briefly posed a significant threat from coastal batteries or patrolling vessels once detected.

*Minefields:* Mine lines attached to the bottom of the Strait with steel cables were present. Submarines had to dive to a certain depth to pass under these mines. However, if the cables became entangled in the hull, the mine being pulled and detonated was one of the greatest risks.

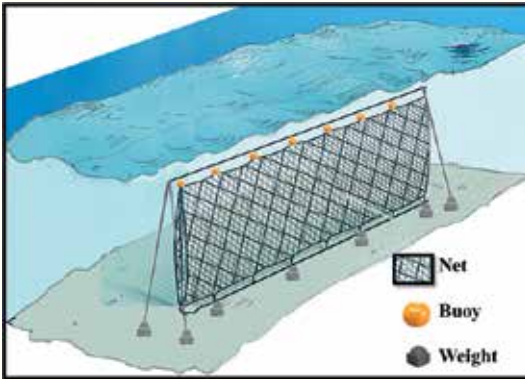
*Net Barrier Systems:* The only way to overcome the nets installed in the Strait was to pierce through them at high speed. However, dragging the nets could reveal the submarine's position, cause it to lose balance, or leave a trail on the surface, exposing its presence.



Periscope-Level Visual of HMAS AE2 in Front of Seddülbahir.



Submarine Mine Obstacles.



Submarine Net Obstacles and Submarine Mine and Net Obstacles Lines.

*Daytime Navigation Requirements:* It was necessary to proceed on the surface until reaching the area where the minefields were located, and then dive. Since the periscope could not be used at night, these operations had to be carried out during the day. This increased the risk of detection by coastal lookouts and batteries.

*Battery Power and Charging Requirements:* Underwater movement time was limited by battery capacity. When batteries ran low, the submarine had to surface and recharge using its diesel engine. Battery charging had to be done by surfacing in safe areas, leaving the submarine vulnerable to attack during this process.

*Two-Layer Current System:* The hydrodynamic structure of the Strait comprised upper and lower layers flowing in opposite directions. These currents could force uncontrolled course deviations and abrupt depth changes.

*Pressure Risks:* Hydrostatic pressure increases with depth. Submarines should not normally exceed the 30-meter operational limit; otherwise, there is a significant structural risk to the hull.

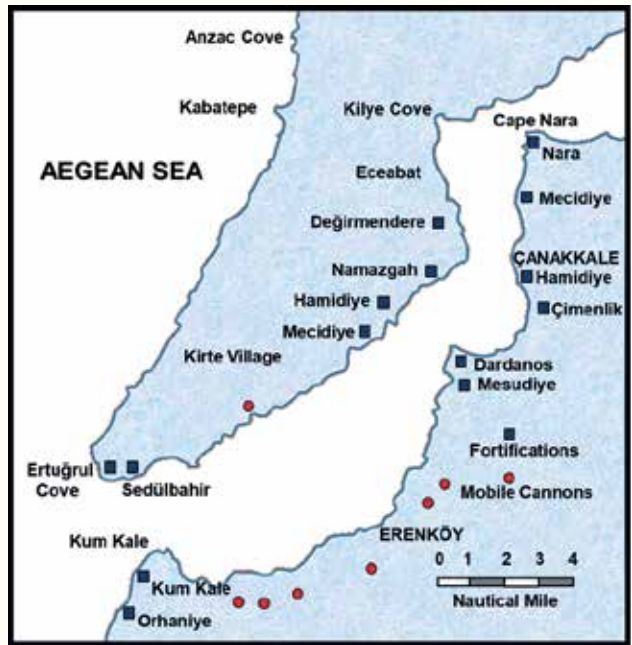


Representative drawing of the submarine HMAS AE2 ascending.

*Vulnerability during Replenishment:* When torpedoes and ammunition needed to be replenished during a mission, the submarine entered a highly vulnerable state. This created a critical exposure to potential enemy attack.

*Turkish Patrol and Surveillance Elements:* The gunboats *Pelengiderya*, *Isareis*, and *Aydınreis* were patrolling the Strait. In addition, surveillance stations were established along both shores, and the crew of the sunken battleship *Mesudiye* was reassigned to these stations. These measures created a continuous threat to submarines.

*Lighting and Projector Threats:* Submarine operations needed to be carried out on dark, moonless nights. Otherwise, submarines traveling slowly on the surface risked being detected by coastal projector.



Lookout points, Bastions and Mobile Gun positions.

## LOCATION OF THE HMAS AE2 WRECK AND FACTORS CONTRIBUTING TO ITS SINKING

*Location of the Wreck:* The wreck of the HMAS *AE2* submarine was discovered in June 1998 as a result of surveys conducted off the coast of Karabiga. The wreck lies upright on a relatively flat seabed at a depth of 72 meters, approximately 4 miles north of Karaburun (Kolay et al. 2013; İşıpek 2020).

## EXAMINATION OF POSSIBLE CAUSES OF THE SINKING

The report submitted by Admiral John De Robeck, Commander of the British Naval Forces, to the Naval Command provides important information on the sinking of the submarine (Çetin 2025). In addition, further information on the cause and circum-



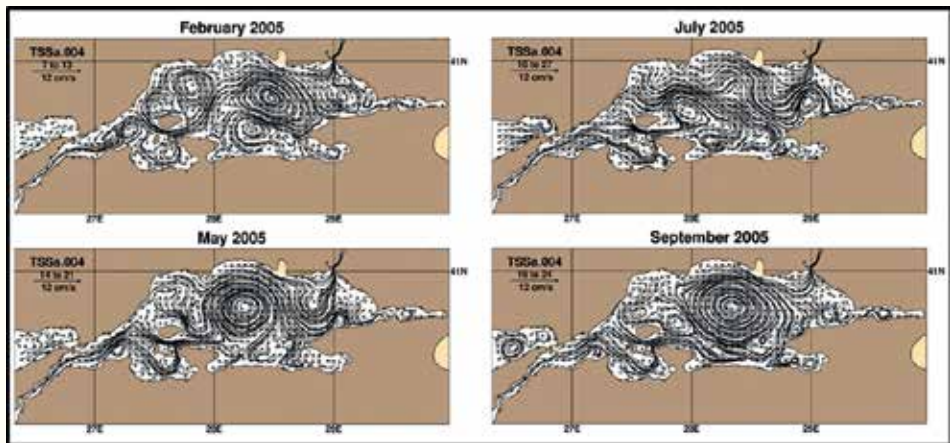
*Possibility of Torpedo Hit:* If a torpedo from the *Sultanhisar* Torpedo Boat had struck *AE2*, it would have caused significant hull damage. Since no such damage has been identified on the wreck, this possibility can be considered unlikely.

*Effect of Gunfire:* It is highly probable that gunfire from the *Sultanhisar* rendered *AE2*'s diving systems inoperative, forcing the submarine to surface.

*Possibility of a Collision:* Some accounts claim that *AE2* struck the stern of *Sultanhisar* while diving bow-first; however, no evidence of such a collision has been observed on the wreck. Therefore, this possibility is considered unlikely.



Images Depicting the Possible Collision Between *Sultanhisar* and HMAS *AE2*.

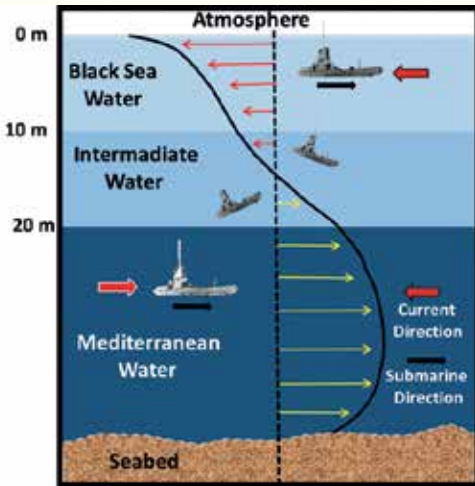


Current modelling of the Sea of Marmara. The red star represents the location of the submarine wreck (Gündüz 2025).

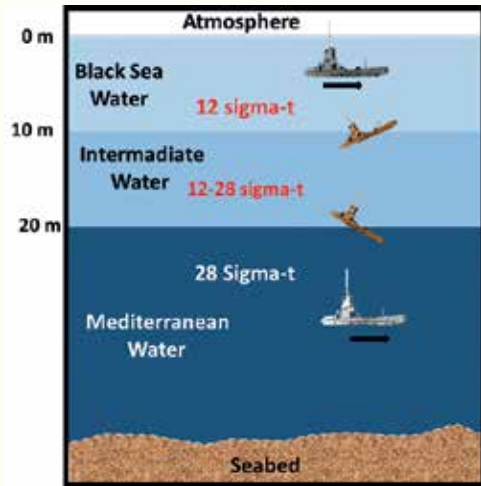
*Effect of Currents:* Current models from different periods indicate the presence of strong currents flowing in opposite directions along the water column in the area where *AE2* was located.

Currents in the lower layer, flowing towards the Sea of Marmara, may have increased the submarine's speed in that direction, while currents in the upper layer, flowing towards the Aegean Sea, may have slowed it down. For the submarine, whose manoeuvrability was greatly reduced and which had to operate throughout the water column, the presence of opposing currents may have contributed to its sinking.

*Density (Sigma-t) Variations:* The two-layer current system and the density profile of the water column (stable at 0–10 m, rapidly increasing at 10–20 m, and high



Schematic representation of the Çanakkale Strait current system and its possible influence on the direction of motion of the HMAS AE2.



Representative illustration of the Çanakkale Strait seawater density profile and its influence on HMAS AE2.

beyond 20 m) represent significant environmental factors that could affect the submarine's ability to perform controlled dives and ascents (TÜBİTAK-MAM 2014). These conditions may have adversely impacted the submarine's stability and manoeuvrability.

*Subsequent Status of Captain Stoker:* Captain Stoker, of Irish origin, did not receive the expected medal for heroism upon returning to his country and subsequently left the navy. Had he scuttled the submarine himself, such recognition might have been awarded. This circumstance can be interpreted as indirect evidence that *AE2* was sunk by Turkish forces.

## CONCLUSION

During the Gallipoli Campaign, the Allied Powers conducted operations in the Çanakkale Strait and the Sea of Marmara with a total of 13 submarines, of which eight were either sunk or captured by Ottoman forces. The Ottoman side, while sustaining losses including battleships such as *Mesudiye* and *Barbaros Hayreddin*, successfully defended the Çanakkale Strait at a strategic level despite the submarine threat. This outcome demonstrates the effectiveness of Ottoman defensive measures and highlights the failure of the Allied Powers to establish naval superiority in the Çanakkale.

The engagement between HMAS *AE2* and the torpedo boat *Sultanhisar* on 29–30 April 1915 provides a striking example of the resilience of the Ottoman naval defence on the Gallipoli Front. Although this encounter did not represent a strategic turning point in the course of the campaign, it stands as a symbolic achievement illustrating the deterrent capability of the Ottoman Navy.

Information regarding the cause and process of the submarine's sinking is available in both Ottoman and foreign sources. In light of this information and considering the characteristics of the environment in which the sinking occurred, the possible causes of the submarine's loss have been examined, with evaluations suggesting that it may have sunk due to a combination of environmental factors and the damage it sustained.

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## THE SILENT ANZAC PROJECT, AE2CF AND THE BILATERAL COOPERATION BETWEEN TÜRKİYE AND AUSTRALIA

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### ABSTRACT

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This chapter examines the discovery, assessment, protection and long-term management of the wreck of HMAS *AE2*, within the framework of the *Silent Anzac* Project and the work of the AE2 Commemorative Foundation (AE2CF). The chapter draws heavily on the final report submitted to the Australian and Turkish Governments by the AE2CF as part of the *Silent Anzac* Project (February 2015). The report was prepared by Tim Smith OAM, Dr Roger Neill, Commodore Terry Roach AM, Captain Ken Greig OAM, and Rear Admiral Peter Briggs AO (Mil), OAM, CSC.

### Keywords

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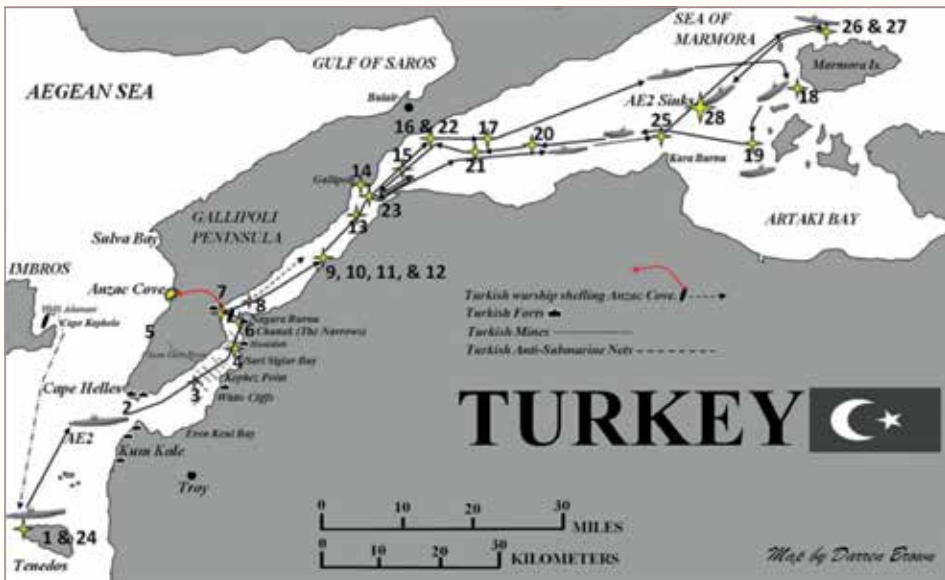
*AE2*, Silent Anzac Project, AE2CF, Australia

## BACKGROUND

### The Significance of HMAS AE2

On the night of the Anzac landings HMAS *AE2* penetrated the Çanakkale Strait (Dardanelles), leading Australian forces into battle and for 4 days attacked the shipping lanes bringing reinforcements to the Çanakkale War (Gallipoli Campaign). It also showed the way for a subsequent Allied submarine campaign that greatly restricted the use of the Marmara Denizi (Sea of Marmara) for Ottoman lines of re-supply. Her success provided one of the few encouraging stories to the invading forces that were otherwise largely rebuffed by the successful Ottoman defences.

*AE2*'s battle with the Ottoman torpedo boat *Sultanhisar* resulted in the loss of the submarine. The crew surrendered after scuttling the submarine; they were all rescued and well treated by the crew of *Sultanhisar*. This act provides an enduring example of humanity in the midst of battle, prefigured Mustafa Kemal Atatürk's famous and moving words of reconciliation in 1934 and is of lasting relevance to both countries.



Darren Brown's diagram of *AE2*'s passage.

Darren Brown's excellent map sets out *AE2*'s exploits. Having been ordered to create a diversion and 'run amok', Dacre Stoker, the Commanding Officer, entered the Çanakkale Strait (Dardanelles) on the surface, to attract attention. The submarine dived at 04.30 in position #3 after coming under shell fire. After negotiating the

minefields dived, Stoker successfully attacked a gunboat at #4, before running aground due to swirling currents at #6 and #7. The second grounding damaged the submarine, but Stoker pressed on. *AE2*'s presence forced an Ottoman battleship bombarding the landing beaches and approaches to cease fire and move away during early, critical stages of the landings at Anzak Koyu (Anzac Cove) (25 April 1915). Stoker's efforts to disrupt seaborne resupply to the Peninsula are reflected in the series of transits and 6 torpedo attacks once in the Sea of Marmara, #14–27. The final encounter with *Sultanhisar* occurred at #28, at 10.00 on Friday, 30 April 1915, *AE2* was scuttled 45 minutes later.

From the Australian perspective *AE2* played an influential role in the Allied offensive by making the first successful penetration of the Çanakkale Strait (Dardanelles) to create a diversion and forcing the passage. From the Ottoman perspective the threat to the movement of their supplies and troops, forcing use of a circuitous and difficult land route, is an enduring example of overcoming adversity in the grave pursuit of national survival.

*Sultanhisar*'s tenacity in pursuing and successfully prosecuting *AE2*, removed a threat to the Ottoman re-supply lines at a crucial early period in the campaign. For both countries the story is a public and easily understood demonstration of the utility of submarines in their defence forces.

*AE2* is the largest and most intact Australian relic remaining from the campaign and a significant piece of Türkiye and Australia's shared maritime heritage.

Australia's Gallipoli submarine, HMAS *AE2* survives as an international site of significant heritage value to Australia and Türkiye and a reminder of naval events surrounding 25 April 1915.

## Discovery and Initial Assessment

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The wreck of the submarine HMAS *AE2* was located in 1998 by Turkish diver and (then) Director of the Rahmi Koç Industrial Museum (Istanbul), Mr Selçuk Kolay OAM. An initial Australian archaeological team headed by Dr Mark Spencer with Maritime Archaeologist Mr Tim Smith OAM, positively identified the wreck to be *AE2* in September 1998, when a preliminary recording and assessment of the wreck site was made. This expedition, Project AE2, provided initial information on the state and complexity of the significant new Gallipoli war relic, established its historical and archaeological values and preferred management options (Smith 1999 and 2000).

Post discovery discussion focused on how best to protect the site in its current contextual setting and what other options might be available. To answer these questions, the original 1999 Conservation Management Plan (Smith 1999) identified the need to derive additional quantitative data on the state and condition of the hull, associated relics and the environment in which *AE2* sits.



Dr Mark Spencer's photo of AE2's bow.

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## Ownership and Authority Over the Site

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The *AE2* submarine lies in the Sea of Marmara within Turkish internal waters, subject to the heritage controls of the Government of the Republic of Türkiye. The AE2CF acknowledged the Turkish Protection and Natural Heritage Act No: 2863 applied and that the submarine and its entire movable inventory remains the cultural property of the Republic of Türkiye<sup>1</sup>. As a military wreck, *AE2* is also subject to the authority of the Turkish General Staff.

The site has been identified to be of national heritage significance to Australia and similarly an important site in the focus of Turkish interests in their ultimate defence against the Allied invasion of the Gallipoli Peninsula during the early stages of World War I (Battle of Çanakkale). As such, both governments have taken an increasing interest in safeguarding the site, with the Turkish Government specially declaring diving prohibitions at the site.<sup>2</sup>

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1 Turkish Ministry of Foreign Affairs Note 2012/KIGY/3575647, dated 18 April 2012, Ankara

2 Turkish cultural heritage legislation. 2863 sayılı *Kültür ve Tabiat Varlıklarını Koruma Kanunu* (1983)

## THE SILENT ANZAC PROJECT

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The Submarine Institute of Australia Inc. (SIA) was accorded a leading role in the management of the Assessment Phase to determine future management options for *AE2* by the Australian Government in 2006. The SIA formed the AE2 Commemorative Foundation Ltd (AE2CF), a registered, not-for-profit charity, to conduct all activities associated with its role and assembled a project team comprising Australian volunteers providing an appropriate array of specialist expertise. An Inter Departmental Working Group chaired by the Royal Australian Navy, provided oversight and ongoing Australian Government visibility of the activities.

A number of public education activities were undertaken in Türkiye and Australia in association with the project, including media releases, TV news items and TV documentaries in both countries; the first was the screening of “Gallipoli Submarine” on the Australian Broadcasting Commission (ABC) TV on 24 April 2008.

The project team established significant goodwill as modern-day ambassadors of friendship and joint cooperation, recognised in Australia and Türkiye.

## ASSESSMENT PHASE

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The pivotal *AE2 Options Workshop* was jointly convened by the SIA and TINA The Turkish Foundation for Underwater Archaeology, and held at Bahçeşehir University in Istanbul, Türkiye on 26 and 27 April 2008, marking the completion of the Assessment Phase.

The program of activities conducted during the Assessment Phase included:

- A Feasibility Study (May 2006).
- Establishment of the AE2 Commemorative Foundation Ltd (AE2CF) operating a trust of the same name and its recognition as a tax-exempt charity with deductible gift recipient (DGR) status by the Australian Parliament (September 2006).
- A rehearsal of field activities, including diving (February 2007).
- The Maritime Archaeological Assessment in September 2007 (MAA07).
- Analysis of data collected during MAA07 and production of a Report (published on the AE2CF’s page of the SIA website in December 2007).
- A Scoping Paper considering the range of options for future management of *AE2* (published on the AE2CF website in February 2008).
- A joint Turkish–Australian workshop in Istanbul to agree a recommendation to both Governments for the future management of *AE2* (April 2008).
- A Report on the outcomes and recommendations of the Workshop (published on the AE2CF page of the SIA website in May 2008).

A limited internal archaeological assessment was conducted as part of the 2007 MAA by inserting a specially developed “drop camera” through the partially opened upper conning tower hatch (opened 100mm) to obtain internal images of *AE2*’s control room. The non-disturbance camera insertion into the hull of *AE2* was a significant MAA achievement. The survey was planned in detail to create no impact to the slightly open conning tower upper hatch or surrounding heritage structure. The Defence, Science & Technology Organisation (DSTO) team members specially designed a flexible umbilical hose and support frame to enable the selected camera to be carefully introduced into the hull and lowered by divers. The camera provided the first images of the interior condition of the *AE2* submarine in the 92 years since its loss. The findings have been critical in identifying the state of the interior metal surfaces and fittings.

The major finding of the 2007 MAA was the significant amount of damage sustained to the exposed casing and fin of *AE2* since its discovery in 1998. At that time the casing that extends the length of the vessel, was largely intact except for some isolated damage from contact with fishing nets, observed as a “sprung” bow plate on the port side, net entrapments on the after portion of the conning tower and at the underside of the stern. There was some limited loss of fabric from natural corrosion processes, perhaps exacerbated by earlier net contact, evidenced with the loss of the hatch covers over the forward winch and the hatch concealing the aft torpedo loading hatch. By contrast, in September 2007 the bow section of the casing had been almost



*AE2*’s Bow 2007 showing Damage since 1998 (Photo Craig Howell).

completely destroyed by an anchor, net, trawling gear, or other similar device and lying as a debris field adjacent to the submarine's port side. Additional portions of the casing have been removed and/or disintegrated; the after structure of the fin has also continued to deteriorate and significant damage was evident.

The 2007 MAA included a comprehensive analysis of the ambient water environment surrounding *AE2*. This included the analysis of water temperature, salinity, dissolved Oxygen, pH levels through the water column and into the surrounding sediments. This data was crucial to understanding the effects of the localised environment on site preservation and corrosion activity, in conjunction with quantitative data of hull thickness and corrosion rates. The most significant outcome was the determination of a strong halocline (change in salinity) between 14–22 metres depth and a marked thermocline (change in temperature). This conforms to the interface between the lower more saline Aegean waters and the upper, fresher Black Sea waters exiting through the Çanakkale Strait (Dardanelles). This salinity interface was probably a major factor in *AE2*'s loss of buoyancy and diving control on 30 April 1915.

A core task of the 2007 MAA was the gaining of detailed corrosion profile data through the deployment of an underwater corrosion meter. Data acquisition required the dive team to expose a small section of bare original metal surface and the application of probes. A difficult operation at depth, the results were limited to two indicative measurements on the pressure hull due to the robust nature of the overlying marine concretions and the resulting poor visibility caused by the air-driven scouring tool. The measurements, however, confirmed the predicted rate of corrosion of the hull plating validating the modelled condition of *AE2*'s hull. A further core task was the gaining of residual hull plate thickness measurements via deployment of underwater ultrasonic measuring instruments. The nature of the marine concretions made the taking of ultrasonic hull thickness measurements impossible, without extensive intervention with the surface layers above the plating; this level of intervention was outside the permitted operations. However, due to the unintentional localised scouring of the aft port ballast tank by the divers' shot line weight, a series of twelve ultrasonic measurements were successfully achieved in the closing stages of the expedition.

This included measurements obtained by the DSTO ROV. The data, while suggesting varying hull plate thicknesses compared to the original hull specifications, provided critical confirmation that the metal plate has survived immersion over 92 years well.

An inadvertent benefit from the accidental impact with the submarine by the divers' shot line weight was the collection of two samples: a small fragment of concretion from the ballast tank and a small ringbolt bracket. Later, sectioned, photographed, and subjected to microscopic imaging, the samples have provided important data on the nature of marine corrosion processes and the nature of corrosion products (concretion). The analysis has suggested that *AE2* has been subject to differing burial lev-

els (perhaps up to four significant phases) over its life. A sample of an unidentified liquid product was also collected after its discovery trapped under the domed conning tower upper access hatch, at the top of the fin. The sample was subjected to a chromatogram analysis revealing it to be a combination of diesel fuel and lube oil.

The public education initiatives undertaken by the AE2CF during this phase included:

- Media and TV news coverage of the rehearsal, MAA07 and workshop in 2007 was complemented by similar coverage of the Implementation work in 2014.
- A number of promotional activities to attract sponsorship and raise general public awareness of the project and the story of *AE2*.
- An internationally released 52-minute drama/documentary production, “Gallipoli Submarine” by the Western Australian production company, Electric Pictures.
- A short documentary on the MAA and *AE2* story shown on CNN Türk.

## Funding

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The Australian Government provided \$25K for the conduct of the Feasibility Phase. This funding was administered by the Department of Environment, Water, Heritage and the Arts. (DEWHA). A further \$388.5K was provided for the conduct of the Assessment Phase in accordance with the plan set out in the Feasibility Phase Report. This funding was administered by the Department of Defence (Navy). The AE2CF raised a comparable cash amount (\$432K) from sponsors during the Assessment Phase. ASC Pty Ltd was foremost amongst these generous sponsors. The list of sponsors also includes Australian Geographic, Thales Australia, Zimmer Inc., Weston Insurance Services, ThyssenKrupp Marine Systems, L3-Nautronix and North Shore Private Hospital. Generous in-kind sponsorship valued at \$251K was provided by Sinclair Knight Merz, DSTO, Australian Marine Technologies, Australian Maritime Systems Ltd, Colkan International, Graphic Art Mart P/L, Hellmann Worldwide Logistics, MARBA, Ms Cecily Belbin, Mussared Communications, Heritage Branch, NSW Department of Planning, OMD Technology Ltd, Patrick Defence Logistics, Paul Wetherill & Associates, Pro Diving Services, SeaBotix, The Alfred Hospital, The Phillips Group P/L, TressCox Lawyers, WA Museum, Ms Becca Saunders & Dr Mark Spencer.

MAA07 provided critical data on the condition of *AE2* (externally and a small portion internally), threats and observed changes to the structure since 1998 and insights into long term conservation priorities. The submarine was in remarkably good condition despite 93 years on the bottom, due to the relatively benign environment it rests in.

The 2008 Workshop unanimously recommended joint Turkish–Australian activities to safeguard *AE2* and tell the *AE2* and *Sultanbisar* story. The recommended way ahead was to:

- Protect and preserve *in situ*.
- Complete an internal archaeological assessment using remotely operated vehicles (ROV) fitted with suitable cameras and instrumentation.
- Undertake education programmes in Türkiye and Australia to ensure the *AE2* and *Sultanbisar*<sup>3</sup> roles in the Gallipoli campaign are better understood in both countries as a basis for ongoing friendship and cooperation.
- Defer any consideration of artefact recovery until the internal assessment results have been analysed.

Why not raise *AE2*? The joint workshop considered this issue at length and unanimously concluded that the best course of action was to protect and preserve *in situ*.

Further details are contained in the MAA Report and The Assessment Phase Report.<sup>4</sup> Put simply raising *AE2* is not a practical idea:

- Physically lifting is the easiest step—the submarine is certainly strong enough if properly handled.
- Stabilizing it chemically and preserving it so it does not rapidly corrode away is a huge task with many unknowns—AE2CF experts estimate 20–25 years of treatment with no certainty of success—no one has done this successfully with an object as large or as complex as the metallurgical make up of *AE2*.
- The AE2CF’s 2008 estimate for the total cost for such a project was \$100–110M AUD to stabilize the submarine. (This does not include the cost of the essential ongoing program to preserve the submarine.) Committing this level of funding to a project of this duration and with so many unknowns would be an extraordinary national commitment.
- There is one torpedo remaining; ignoring it is risky, neutralising it is risky and success problematical.

The submarine is in a relatively benign environment, resting in low oxygen silt, covered by a protective layer of concretion, out of reach of most recreational divers and lying where it fell in 1915. Given the protection and preservation measures proposed in this Proposal it should still be available to future generations of Australians and Turks for many years to come. It is possible to “tell the story” with much greater certainty and for a fraction of the costs involved in raising it.

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<sup>3</sup> *Sultanbisar* critically damaged *AE2* by gunfire which led to the scuttling of the submarine on 30 April 1915.

<sup>4</sup> Operation *Silent Anzac* – Report to the Australian Government on the Assessment Phase HMAS *AE2*, *AE2CF*, dated 10 June 08.

## IMPLEMENTATION PHASE

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### Preparations

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During the Assessment Phase the Turkish Ministry of Foreign Affairs acted as the coordinating agency for the Turkish Government. On the Australian side the Department of Foreign Affairs and Trade in Canberra and the Embassy in Ankara provided an essential link, ably led by the Assistant Defence Attaché, Captain Simon Ottaviano. The work of these agencies was critical to the success of the Project.

Dr Harun Özdaş, Director of the Institute of Marine Sciences and Technology, Dokuz Eylül University, Izmir) joined the Implementation Phase team as the AE2CF's Maritime Archaeologist (Türkiye), adding an invaluable Turkish perspective and precious assistance by facilitating consideration of the proposals within the Turkish Ministry of Culture and Tourism. A dialogue was also commenced with the Gallipoli 100 Year Research Centre at the Bahçeşehir University, Istanbul with a view to collaboration. The project therefore provided an excellent opportunity to make a positive contribution to centenary commemorations in Türkiye and Australia.

The afloat work required approval from a number of authorities at the working level, e.g. Coastguard, Harbourmasters in Tuzla and Karabiga. DEEP Offshore obtained the necessary approvals for the diving operations. In completing these processes, the Project depended heavily on two sources of Turkish expertise; Mr Murat İçel, a maritime services and diving expert and Mr Ümit Küçüköğlü, widely experienced in the maritime Ministries and related authorities. Their assistance in understanding and satisfying the requirements of these authorities was critical to success.

Based on the outcomes of the Workshop, a Joint Proposal was developed to implement the agreed actions and used to obtain the in-principle agreement of the Australian and Turkish Governments on the outcomes to be achieved from the Implementation Phase. A funding application was prepared seeking an Australian Government grant in the May 2012 Federal budget. This was unsuccessful and plans were adjusted to accommodate the reduced timescale until the centenary in 2015. An amended funding application for \$2.7M was approved in the May 2013 budget.

Detailed preparations commenced in July 2013 when funds were received; a Turkish legal firm was engaged to provide legal support, Request for Tender for the Afloat Services was issued to 3 Turkish companies and construction of the various cameras, lighting, divers support platform and a mock-up of *AE2's* conning tower and control room undertaken. This was a particularly busy time for the AE2CF's team of volunteers.

## Mission Rehearsal and Training Exercise

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Prototype testing for the cameras, associated lighting and insertion jigs was undertaken at the Defence Science and Technology Organisation in Fishermans Bend. In the USA, SeaBotix began assembling a specially configured ROV (a modified vLBV) and its tether management system. These measures came together in a Mission Rehearsal and Training Exercise involving all team members, specialists from the selected Turkish company DEEP Offshore and the RAN Reserve Diving Team 6 (ANRDT 6) in Corio Bay, Geelong in December 2013.

The formal approval process to undertake work on *AE2* proceeded in parallel with these preparations; formal approval was received from the Turkish Ministry of Foreign Affairs in late 2013 and the detailed Archaeological Permit Application was subsequently approved by the Turkish Ministry of Culture and Tourism. This process was greatly assisted by support from the Australian Department of Foreign Affairs, the Deputy Defence Attaché in Ankara, Captain Simon Ottaviano RAN and the Turkish Ministry of Foreign Affairs.

The advanced party for the MAA14 arrived in Türkiye at the end of May and the balance of the AE2CF team arrived as the diving support vessel was mobilised and a final rehearsal in shallow water was undertaken with the Turkish diving team before deploying to the site on 7 June. The small fishing village and regional centre of Şarköy was used as the mounting base. Over the course of the next 2 weeks the combined AE2CF and DEEP teams worked together to deliver all the agreed outcomes for MAA14.

Success was not without challenge. However, initiative and a skilful “can do” spirit from the truly joint team overcame the many obstacles to deliver a very successful MAA:

- A huge amount of data was collected using external and internal video footage, high-definition sonar and water quality measurements.
- The cathodic protections system, the world’s largest such system on an iron shipwreck was installed and checked to be working correctly.
- A secure conning tower hatch was installed to guard against illicit entry.
- A navigation buoy with light and AIS transponder was installed over *AE2*.
- An ABC TV Catalyst program telling the story of *AE2* and the MAA aired on ABC TV in Australia on 28 August.
- Sensible Films produced a 45’ documentary, titled *AE2 The Silent Anzac*.

Analysis of the images and internal data was a huge task, the results are reflected in the detailed reports attached. Annex B provides an index of interesting images extracted from the video records. The team has focussed on 3 areas; the Conning Tower, Control Room and Wardroom, much remains to be analysed and identified. Sev-

eral tantalising images invite further examination; for example, what is the object in the Port amidships torpedo tube—could it be the missing torpedo, see further discussion in Annexes D and E?



Image of Port Torpedo Tube, Tube Shell broken away to reveal an Object within.

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The Education Program undertaken with Australian Teachers of Media (AT-OM) has delivered a number of web-based products targeting primary and secondary students and their teachers. Products include; student and teachers guides, a graphic novel (hard copy and EBook), a centenary edition of the book Stoker's Submarine (hard copy and EBook), a resource book summarising sources of information and a poster for school libraries. Clips for the documentaries have been used in the EBook products to bring the story to life.

Five commemorative plaques by the renowned sculptor Dr Ross Bastiaan, ED, AM have been unveiled in Australia.

Three bilingual plaques were unveiled in Türkiye. The first plaque was unveiled in a joint military ceremony at the Turkish Navy's Maritime Museum at Çanakkale on 24 April 2010.

The second plaque was unveiled at the Turkish Navy's Maritime Museum, Beşiktaş in Istanbul on 22 April 2014. The third plaque was unveiled on 21 April

2015 at the Kabatepe Display Centre on the Gallipoli Peninsula, during the 2015 centennial commemorations.

### Funding of The Implementation Phase

The Australian Government, through the Centenary of Anzac Commemoration Funding provided \$2.55M to the AE2CF for the conduct of the Implementation Phase. This funding was administered by the Department of Veterans' Affairs, (DVA). The purpose of this Grant was to implement the Silent Anzac Project as set out in the AE2CF application, including the protection and preservation of the submarine, HMAS *AE2*, and the development of a web-based education program. The AE2CF submitted a plan to conduct a 15-day Maritime Archaeological Assessment of *AE2* focusing on the internal spaces of the wreck.

During this phase the AE2CF was successful in attracting sponsorship from industry including; ASC Pty Ltd, Thales Australia, ThyssenKrupp Marine Systems Australia (formerly Australian Marine Technologies), Australian Maritime Systems Ltd, Defence Housing Australia, L3-Nautronix and Austal. Generous in-kind sponsorship was provided by Paul Wetherill & Associates, DSTO, Graphic Art Mart P/L, Hellmann Worldwide Logistics, SeaBotix Inc and Geelong Ports.



Joint Unveiling by the then Minister for Defence & Personnel, the Hon Warren Snowdon MP & Mr Renan Şekeroğlu, Consul General on 22 April 2009.



Joint Unveiling at Çanakkale, Türkiye by VADM Mehmet Otuzbüroğlu, CIC Northern Fleet Command and VADM Russ Crane AO, Chief of Navy, 24 April 2010.



Joint Unveiling at the Maritime Museum, Istanbul by Admiral Bülent Bostanoğlu, Commander Turkish Naval Forces and General David Hurley, Chief of the Australian Defence Force unveil the plaque, the nameplate for SULTANHISAR and a model of AE2.

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## Total Project Funding

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Overall, \$3.5M was expended on the Project; \$3M Government grants, \$0.5M sponsorship and many hours of uncosted effort from the team of volunteers and specialist supporters.

## Completion and Project Closure

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Project Silent Anzac was formally complete on 30 June 2015 when the AE2CF ceased operating. All the data and resources (including the remaining funds) generated in the 9-year effort to protect, preserve and tell the story of HMAS *AE2* was handed into the care of the Australian National Maritime Museum. The expertise and energy of the team of volunteers so critical to the success of the project will remain available to the Museum in its future efforts to preserve *AE2* and tell the story of this piece of Türkiye and Australia's shared maritime history.

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Gwen Simpson, daughter of P.O. Cecil Arthur Bray (one of the AE2 crew members), with a framed print of the AE2 submarine and her father's tally band beneath it (Photo Mark Spencer).

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## LEGAL STATUS OF WRECKS OF WARSHIPS AND THE AE2 SUBMARINE WRECK IN INTERNATIONAL LAW

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### ABSTRACT

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The customary international law concerning the legal status of wrecks of warships situated in internal waters and territorial seas has not yet been fully crystallized, largely due to political sensitivities. While an emerging customary rule upholds the continuity of flag States' sovereign immunity and property rights over such wrecks, capture during naval warfare constitutes a mode of transfer of title. In this context, the Australian HMAS *AE2*—sunk by the Turkish torpedo boat *Sultanbisar* on 30 April 1915 during the Çanakkale Campaign, following the surrender of the entire *AE2* crew—provides a clear example of a legal capture in naval warfare. By combining theory and State practice, the present chapter clarifies the legal regime of the *AE2* submarine wreck—located in the Marmara Sea, within Turkish internal waters—both as underwater cultural heritage and as a captured warship under Türkiye's ownership and exclusive jurisdiction over activities related to the wreck. The story of the *AE2* and *Sultanbisar*, together with the cooperation between Türkiye and Australia in previous preservation efforts, stands as a notable example for the future of bilateral relations between the two nations.

### Keywords

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Wrecks of Warships, *AE2* Submarine Wreck, Underwater Cultural Heritage, Capture

## INTRODUCTION

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**A**mong shipwrecks constituting underwater cultural heritage, wrecks of warships stand out as a particularly complex and still unclear area, especially with regard to the crystallization of customary rules applicable to potential disputes between States.

Therefore, State practice, as the material element of custom, remains of particular importance in resolving such disputes between States. Meanwhile, there are international conventions whose scope encompasses aspects of the legal status of such wrecks, particularly the *2001 UNESCO Convention on the Protection of Underwater Cultural Heritage*—which nevertheless remains neutral with regard to questions of title over these wrecks.<sup>1</sup> Thus, in addition to the limited number of States that have become parties to the Convention and the political sensitivity of the issue—which renders customary international law particularly important in cases concerning wrecks of warships—the question of ownership often emerges as a core issue, rather than issues relating to preservation.

In this respect, potential disputes may arise between the coastal State exercising control over the wreck—particularly when these are situated in the territorial sea, archipelagic waters, or internal waters of a State where it exercises full sovereignty—and the flag State that does not relinquish its title over the warship. The culmination of these disputes is the emerging customary rule upholding the continuity of flag States' sovereign immunity and property rights over such wrecks, with capture during naval warfare constituting a mode of transfer of title.

The Australian HMAS *AE2* submarine, sunk by the Turkish torpedo boat *Sultanbisar* on 30 April 1915 during the Çanakkale Campaign, with the surrender of the entire *AE2* crew before the sinking, constitutes a clear example of a legal capture in naval warfare and, thus, a case in which title passed from the flag State to the captor State, which will be addressed in more detail throughout the chapter.

The *AE2* submarine wreck holds particular importance for both Australia and Türkiye as a symbol of friendship that began after the Çanakkale Campaign of 1915. Moreover, as underwater cultural heritage, it is not only a Turkish-captured submarine but also a legacy of both humanity and Australia as a State with a historical, cultural, or archaeological link to it. While Australia is no longer the flag State of the *AE2* submarine due to its capture and therefore no longer holds property rights over the wreck, Türkiye nevertheless remains under a customary obligation to cooperate with Australia—an obligation, to be examined in the second part, arising from the underwater cultural heritage status of the wreck and one that Türkiye has abided by during previous works on it.

The present chapter aims to establish the legal regime of the *AE2* submarine wreck, both as underwater cultural heritage and as a captured warship under the ownership

1 Aznar-Gomez 2010, p. 225.

and exclusive jurisdiction of Türkiye over any activities concerning the wreck, which is situated in the Marmara Sea, Turkish internal waters. It will discuss the status of the wreck in detail under two parts, navigating from the general to the specific legal framework: 1. Legal Status of Wrecks of Warships Situated in Internal Waters and the Territorial Sea in International Law, and 2. Legal Status of the *AE2* Submarine Wreck.

## 1. Legal Status of Wrecks of Warships Situated in Internal Waters and the Territorial Sea in International Law

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The legal regime of wrecks of warships, and particularly the status of the *AE2* submarine wreck, positions itself at the intersection of different branches of public international law; namely, the law of the sea, cultural heritage law, environmental law, and the law of naval warfare. This uniqueness, combining history and law, requires an interdisciplinary analysis. The first part, before analysing the *AE2* submarine wreck in detail, aims to establish the foundations of the general framework related to the legal status of wrecks of warships situated in internal waters and the territorial sea by examining the following three sections: the applicable law, consisting of the treaty and customary international law; the emerging rule of international law on the flag State's continuing sovereign immunity and property rights; and capture as a mode of transfer of the flag State's title over wrecks of warships.

### 1.1. Applicable Law

Though the legal regime regulating wrecks of warships is not perfectly clear and still contains controversial aspects, there exist rich guiding instruments regarding the applicable law on the *AE2* submarine wreck. As the matter falls within the scope of public international law, the primary sources of international law listed in the famous Article 38 of the Statute of the International Court of Justice (ICJ)<sup>2</sup> will serve as the starting point of the present chapter. This applicable law consists of international treaties and international custom, which are equally binding and constitute equally primary norms without any hierarchy between them.<sup>3</sup>

#### 1.1.1. Treaty Law

As the particular history of the *AE2* draws on interdisciplinary sources and oscillates between the international law of the sea, cultural heritage law, and the law of na-

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2 United Nations 1945, art. 38. While according to this listing, treaties, custom, and general principles of law are qualified as primary sources of international law, judicial decisions and the doctrine are qualified as secondary sources.

3 Öktem 2013, p. 13.

val warfare, the same approach applies to the examination of the normative sources. Firstly, the *United Nations Convention on the Law of the Sea* (UNCLOS), often referred to as the “constitution of the oceans,”<sup>4</sup> is the primary instrument regarding treaty law applicable to wrecks of warships. While it does not specifically and adequately regulate wrecks of warships or underwater cultural heritage,<sup>5</sup> as a general framework for the entire law of the sea, it contains only two articles<sup>6</sup> related to the protection of archaeological and historical objects in a general sense.

Nevertheless, UNCLOS remains important for wrecks of warships, as these are located in different maritime zones defined by the Convention. It should be noted that while Australia is a State party to UNCLOS, Türkiye is one of the few remaining States not party to this major convention for the oceans. Thus, Türkiye is not bound by its provisions of a non-customary nature, many of which are nevertheless accepted as reflecting customary international law;<sup>7</sup> and for those provisions of customary nature, it is also not bound if it qualifies as a persistent objector. This particular position of Türkiye, however, is not relevant to the question of wrecks of warships.<sup>8</sup> Another contribution of UNCLOS in this matter, is the definition of warship as meaning: “*a ship belonging to the armed forces of a State bearing the external marks distinguishing such ships of its nationality, under the command of an officer duly commissioned by the government of the State and whose name appears in the appropriate service list or its equivalent, and manned by a crew which is under regular armed forces discipline.*”<sup>9</sup>

Secondly, after UNCLOS, the *2001 UNESCO Convention on the Protection of Underwater Cultural Heritage*, as a more specific instrument related to objects under the sea, should be noted. Although Türkiye and Australia are not parties to the 2001 UNESCO Convention,<sup>10</sup> it remains highly important both for the general legal regime of wrecks of warships and for the specific regime of the *AE2* submarine wreck. The definitions and general principles relating to underwater cultural heritage con-

4 Koh 1983, pp. xxxiii–xxxvii.

5 Dromgoole 2016, pp. 182–183; Aznar-Gomez 2003, p. 85; Vadi 2010, p. 261.

6 United Nations 1982, arts. 149 and 303. While Article 149 concerns the archaeological and historical objects in international seabed area, Article 303 is titled “Archaeological and historical objects found at sea” and encompasses a broader look to the protection of such objects, underlining the duty to protect and cooperate, while also emphasising that “this article is without prejudice to other international agreements” on this matter.

7 Churchill et al. 2022, p. 27 and pp. 12–18.

8 While Türkiye is one of the 4 States voted against the adoption of the Convention, its objections were not against the concept of underwater cultural heritage; see *infra* note 10.

9 United Nations 1982, art. 29. This definition of warships finds its roots in the 1907 Hague Convention (VII) on the Conversion of Merchant Ships into Warships. See, ICRC International Humanitarian Law Database n.d., Convention (VII), arts. 1–5.

10 The reasons expressed in the statement of the delegation why Türkiye did not become party to the Convention were: the reference to UNCLOS, the dispute settlement mechanism and the non-possibility to make reservations, see Garabello and Scovazzi (eds.) 2003, pp. 250–251. On the other hand, Australia has an intention to ratify the Convention in the future. See Forrest 2019, p. 236; Parliament of Australia 2023; and Australian Government Department of Climate Change, Energy, the Environment and Water 2025.

tained in the Convention, as well as Article 7, entitled “*Underwater cultural heritage in internal waters, archipelagic waters and territorial sea*,” provide a useful framework for analysing the legal issues arising in the present case. A dive into the Convention is relevant on the one hand, as the principal international instrument<sup>11</sup> concerning the protection of underwater cultural heritage, and, on the other hand, because of its impact on the crystallization of customary international law.

Accordingly, both the 2001 UNESCO Convention and the Resolution on the “*Legal Regime of Wrecks of Warships and Other State-owned Ships in International Law*” adopted by the *Institut de droit international* (IDI) in 2015—to be examined in the next subsection—are relied upon in this chapter not as directly applicable law to the AE2 submarine wreck, but as interpretative guidance, in order to identify the codified and customary rules applicable to the present case.

Primarily, the term “underwater cultural heritage” is defined in the UNESCO Convention, in a non-exhaustive way, as meaning “*all traces of human existence having a cultural, historical or archaeological character which have been partially or totally under water, periodically or continuously, for at least 100 years such as... b) vessels, aircraft, other vehicles or any part thereof, their cargo or other contents, together with their archaeological and natural context...*”<sup>12</sup> This 100-year time limit was one of the controversial issues related to the Convention;<sup>13</sup> however, in any case, it no longer poses a difficulty for the wrecks of World War I (WWI);<sup>14</sup> hence, the AE2 submarine wreck, as this rich cultural, historical and archaeological collection of WWI wrecks, is already more than 100 years old. Moreover, the Convention also defines “State vessels and aircraft” as meaning “*warships, and other vessels or aircraft that were owned or operated by a State and used, at the time of sinking, only for government non-commercial purposes, that are identified as such and that meet the definition of underwater cultural heritage*”. This definition, and the utilization of the owning State for government non-commercial purposes, are mainly preserved in the 2015 Resolution of the IDI.<sup>15</sup>

Furthermore, some of the objectives and general principles of the Convention should also be highlighted: the obligation of States to cooperate, the preservation of underwater cultural heritage for the benefit of humanity, the choice of the *in situ* preservation as the first option, the prohibition of commercial exploitation, and the respect for human remains are among the principles that are reflected in the IDI Resolution.<sup>16</sup>

Additionally, it should be noted that the Convention adopts a zonal approach—similar to that of UNCLOS for different maritime zones—and that the coastal State’s

11 With 81 State parties, and entered into force 2 January 2009, See UNESCO n.d.

12 United Nations 2001, art. 1. See also, Forrest 2019, pp. 210–211.

13 Boesten 2002, pp. 137–140.

14 See Forrest 2019, p. 211. The wrecks of World War I are also called as “legacy wrecks”, as an artistic term and sub-class of historic wrecks and underwater cultural heritage, in Forrest’s comprehensive “maritime legacies and law” book dedicated to this particular category of wrecks, p. 3.

15 Dromgoole 2016, pp. 185–186.

16 Dromgoole 2016, p. 188. See also, Aznar-Gomez 2003, pp. 90–98.

jurisdiction over a wreck within its maritime zones gradually decreases in favour of the flag State: from zones where it exercises full sovereignty (such as internal waters and the territorial sea), to zones where it enjoys specific rights and obligations (the EEZ and continental shelf), and finally to the Area (beyond the limits of national jurisdiction), where it has neither sovereignty nor jurisdiction and which is governed by the principle of the common heritage of humankind. In this regard, Article 7 of the Convention regulates underwater cultural heritage in internal waters and the territorial sea. Article 7 is formulated as follows: “*States Parties, in the exercise of their sovereignty, have the exclusive right to regulate and authorize activities directed at underwater cultural heritage in their internal waters, archipelagic waters, and territorial sea.*” The issues related to the sovereign immunity of flag States will be examined in the second section, after the subsection on customary international law related to the wrecks of warships.

Lastly, to close this subsection on treaty law, three other international treaties, which do not directly concern the case of the *AE2*, should also be briefly mentioned. These are: the 2007 Nairobi International Convention of the Removal of Wrecks, to which Türkiye and Australia are not parties; the 1989 International Convention on Salvage, which excludes warships from its scope<sup>17</sup> and the 2004 United Nations Convention on Jurisdictional Immunities of States and their Property, which is not yet in force and which serves only as guidance, being declaratory of existing customary international law with regard to the jurisdictional immunities of warships.<sup>18</sup>

### 1.1.2. Customary International Law

As Australia and Türkiye are not parties to the 2001 UNESCO Convention, and as the Convention is not universally or quasi-universally adopted like some other treaties,<sup>19</sup> the examination of customary international law regarding wrecks of warships is highly important. The same unclear, non-crystallized customary nature, the fragmentation of sources on this issue, the limited number of States that have ratified the 2001 Convention, and the development of State practice have all contributed to the re-examination of this topic by the prestigious *Institut de droit international (IDI)*, whose objective is “*to promote the progress of international law through, among other things, clarifying and highlighting the characteristics of the law as it exists (lex lata), in order to encourage respect for that law, and opining on what the law ought to be (de lege ferenda)*”.<sup>20</sup>

17 Aznar-Gomez 2003, pp. 71–72.

18 Dromgoole 2016, p. 189.

19 Such as, the 1972 UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage with 196 State parties and UNCLOS with 172 State parties. See *supra* note 11 and respectively: UNESCO 2024 and United Nations Treaty Collection n.d.

20 Dromgoole 2016, p. 182. It is the uncertainty over the status of sunken vessels, the fragmented and complex regime, the progressive developments over the last 30 years, and the political sensitivity that led to the adoption of the 2015 Resolution.

Firstly, it should be noted that international custom, a *sui-generis* source specific to the structure of international society, is as important as treaties and, legally speaking, equally binding.<sup>21</sup> Based on the definition in Article 38 of the Statute of the ICJ,<sup>22</sup> it is accepted that custom comprises a material element, expressing State practice and a psychological element (*opinio juris*)—the “*general practice accepted as law*”—expressing the belief that the State acting in a certain way that it has a legal obligation to behave that way.<sup>23</sup> Customary law, which differs from mere usage due to this latter element,<sup>24</sup> thus stands on an equal footing with international treaties, even though it is unwritten.

The importance of this particular source arises especially in cases where agreement among States on the maturity of a norm to become binding has not yet been reached and the State practice on this matter is not sufficient or uniform yet, meaning that the customary rule has not crystallized; or where an international treaty exists in relation to the dispute, but the parties are not bound by it, and whether the treaty’s provisions have attained customary status remains controversial.<sup>25</sup>

The case of wrecks of warships with regard to their customary nature reflects a similar scenario: the customary status of the regime as a whole remained unsettled and accordingly became the subject of a resolution by the IDI in 2015, which constitutes an authoritative expression of the doctrine and a relevant instrument for clarifying the existing customary international law on wrecks of warships.

The IDI Resolution firstly defined “wreck” as meaning: “*a sunken State ship which is no longer operational, or any part thereof, including any sunken object that is or has been on board such ship*” and “the sunken State ship” as meaning: “*a warship, naval auxiliary, or other ship owned by a State and used at the time of sinking solely for governmental non-commercial purposes. It includes all or part of any cargo or other object connected with such a ship regardless of whether such cargo or object is owned by the State or privately. This definition does not include stranded ships, ships in the process of sinking, or oil platforms.*”<sup>26</sup>

Secondly, in parallel with the definition in the 2001 UNESCO Convention, it maintained the 100-year time limit and, in its article related to cultural heritage, stated that “*a wreck of an archaeological and historical nature is part of cultural heritage when it has been submerged for at least 100 years.*”<sup>27</sup> The IDI also confirmed the duty of

21 For an introduction to the own world of custom see Öktem 2013, pp. 1–19.

22 The Statute listed international conventions, “*international custom, as evidence of a general practice accepted as law*”, general principles of law as primary sources of international law that the Court shall apply in a dispute submitted to it. See also the Draft Conclusions on the identification of customary international law of the International Law Commission, United Nations 2018, pp. 121–156.

23 Shaw 2017, p. 55 and United Nations 2018, p. 138, conclusion 9.

24 Shaw 2017, p. 62.

25 See United Nations 2018, p. 143, conclusion 11, regarding the significance of treaties for the identification of customary international law.

26 Institut de droit international 2015, pp. 371–372, art. 1.

27 Institut de droit international 2015, p. 372, art. 2. See Dromgoole 2016, p. 187, that the Resolution reflected the regime in the 2001 Convention; however, this does not mean that the international society exclude younger material having potential cultural value.

States to cooperate in the preservation of cultural heritage, reflecting Article 303 of UNCLOS.<sup>28</sup>

Lastly, to conclude this introductory section on treaty and customary law applicable to wrecks of warships, and specifically to the *AE2* submarine wreck, the emerging rule on the continuity of the flag State's sovereign immunity and property rights requires a closer examination in the following section—as a matter at the heart of the customary international law.

## 1.2. Flag State's Sovereign Immunity and Property Rights Over Wrecks of Warships

The customary international law on the wrecks of warships, both regarding the State practice of major maritime States and the *opinio juris* of these States as to the existence of such a binding rule, appears to tend towards an emerging rule upholding the continuity of the sovereign immunity and property rights of flag States over a wreck of a warship, unless title has been expressly abandoned, transferred, or lost through capture in armed conflict at sea.

As mentioned in the previous section, the IDI Resolution—while not directly reflecting customary law—will serve as part of the interpretative guidance in researching this emerging customary rule on the continuity of the flag State's sovereign immunity and property rights.

Regarding the core aspects of the legal regime of wrecks of warships situated in internal waters and the territorial sea, Article 7 of the IDI Resolution, concerning the zonal approach and more specifically the balance between the rights and jurisdictions of the flag State and the coastal State, should be noted.<sup>29</sup> This complex jurisdictional issue is highly relevant to the following discussion on the sovereign immunity. Article 7, titled “Sunken State ships in internal waters, archipelagic waters and the territorial sea,” addresses this matter by stating that “*the coastal State, in the exercise of its sovereignty, has the exclusive right to regulate activities on wrecks in its internal waters, archipelagic waters, and territorial sea without prejudice to Article 3 of this Resolution.*”

While Article 7 of the 2001 UNESCO Convention does not explicitly mention the sovereign immunity of the flag State—imposing only a softened duty to inform the flag State,<sup>30</sup> by stating that “*within their archipelagic waters and territorial sea, in the exercise of their sovereignty and in recognition of general practice among States, States Parties, with a view to cooperating on the best methods of protecting State vessels and aircraft, should inform the flag State Party to this Convention and, if applicable, other States with a*

<sup>28</sup> Dromgoole 2016, p. 188.

<sup>29</sup> Dromgoole 2016, p. 192.

<sup>30</sup> The wording of the article, by using the term “should” instead of “shall” and by not expressly mentioning internal waters in the article, was one of the controversial issues in the 2001 Convention. Dromgoole 2016, pp. 192–193; Forrest 2019, p. 226. See also Aznar-Gomez 2003, pp. 89–90, expressing that this wording of the Convention does not automatically mean that title lies with the coastal State.

*verifiable link, especially a cultural, historical or archaeological link, with respect to the discovery of such identifiable State vessels and aircraft*—Article 7 of the IDI Resolution contains a more explicit reference to the sovereign immunity of flag States.

Thus, the Article 3 of the Resolution, referred to in Article 7 and titled “Immunity of sunken State ships,” reads as follows: “*without prejudice to other provisions of this Resolution, sunken State ships are immune from the jurisdiction of any State other than the flag State.*”<sup>31</sup> Moreover, although the 2001 UNESCO Convention does not emphasize the sovereign immunity rule as clearly as the IDI Resolution, it nevertheless mentions it—though in a manner insufficient for its wide acceptance—<sup>32</sup> in Article 2(8), which states that “*Consistent with State practice and international law, including the United Nations Convention on the Law of the Sea, nothing in this Convention shall be interpreted as modifying the rules of international law and State practice pertaining to sovereign immunities, nor any State’s rights with respect to its State vessels and aircraft.*”

Firstly, before analysing the “direct tension”<sup>33</sup> between the immunity of the flag State and the exclusive jurisdiction of the coastal State, a few words on the notion of sovereign immunity should be noted. Neither UNCLOS nor the 2004 United Nations Convention on Jurisdictional Immunities of States and their Property regulates the jurisdictional immunities of State vessels after they have sunk.<sup>34</sup> However, the immunities of ships used for government non-commercial services, including operational warships, are generally accepted as reflecting customary international law.<sup>35</sup> It is argued, based on the definition of warships, that their sovereign immunity is no longer maintained after sinking, because the State organ notion of the sunken warship is lost.<sup>36</sup> Nonetheless, this argument does not appear to have gained support from the international society, including the practice of major maritime States,<sup>37</sup> or

<sup>31</sup> Institut de droit international 2015, p. 372.

<sup>32</sup> Aznar-Gomez 2003, p. 89; Boesten 2002, pp. 143–144. See also Aznar-Gomez 2010, pp. 224–227 for an examination of Article 2(8) in light of the sovereign immunity rule.

<sup>33</sup> Dromgoole 2016, p. 192.

<sup>34</sup> Dromgoole 2016, p. 189; Oyama 2021, p. 3; Vadi 2010, pp. 260–261.

<sup>35</sup> Oyama 2021, p. 2; Roach 2015, para. 5–6; Vadi 2010, p. 260. Articles 32 and 95 of UNCLOS is one of the texts codifying immunities of warships, which was already codified in the 1958 Geneva Convention on the High Seas. See also Calvo 1885, “navires”, p. 11 for an earlier book mentioning the immunities of warships. For a clarification on the immunities of warships, see the “ARA Libertad” order of ITLOS 2012, paras. 62, 63, 95, 98.

<sup>36</sup> Degan 2012, p. 1. That argument is based on a definition made by Oppenheim, stating that: “...warships are State organs only so long as they are manned and under the command of a responsible officer, and further, so long as they are in the service of a State. A shipwrecked warship abandoned by her crew is no longer a State organ...”. See also, Vadi 2010, p. 265; They 2016, pp. 491–494. On the other hand, it is argued that in any case, the losing of ship notion of a sunken ship, if accepted, does not imply that the wrecks have ceased to be the public property of the flag State. Aznar-Gomez 2003, p. 76.

<sup>37</sup> See Forrest 2019, pp. 93–95 and 143–144, respectively related to declarations of maritime States, including France, Germany, Japan, Russia, Spain, UK and US on the continuity of ownership rights and declarations of France, Germany and UK on the continuity of sovereign immunity. The author underlines that despite these positions, there are situations where the express abandonment theory does not appear to have been respected or applied.

from the majority of eminent jurists of the IDI examining the legal status of wrecks of warships.<sup>38</sup> The *travaux préparatoires* of the IDI even concluded that the sufficient State practice amounted to customary international law.<sup>39</sup>

As a small parenthesis, it is interesting to note that the emergence of the rule of sovereign immunity as a customary norm appears to have been shaped by the same currents as the development of the principle of the freedom of the high seas in the law of the sea—both being historically linked to the enduring struggle to emerge as maritime powers.<sup>40</sup>

Although the relationship between sovereign immunity and property rights is complex and the two do not always overlap, the property rights of the flag State over wrecks of warships are a corollary of the former principle, or *vice-versa*.<sup>41</sup> In this regard, Article 4 of the Resolution titled “Sunken State ships as property of the flag State” states that “*Sunken State ships remain the property of the flag State, unless the flag State has clearly stated that it has abandoned the wreck or relinquished or transferred title to it.*”<sup>42</sup> The principle that the flag State does not lose ownership of a wreck of a warship unless it expressly abandons its title, has consequences for the tensions between a coastal State hosting a wreck in its maritime zones and the flag State retaining its title.<sup>43</sup> This tension especially reaches its peak when the wreck is located in zones where the coastal State exercises full sovereignty, namely the territorial sea, internal waters and archipelagic waters.

Although the sufficiency of State practice remains controversial, it appears increasingly established in customary international law that, while the location of a wreck grants the coastal State the exclusive right to regulate activities on wrecks situated in its territorial seas and internal waters, the location itself is irrelevant to the flag State’s ownership of the wreck.<sup>44</sup> Thus, in cases of conflict between the sovereign

38 It should be mentioned here that within the 51 jurists of IDI, Articles 3 (on the rule of sovereign immunity), and 7 (on internal waters and the territorial sea) mentioned above and Article 6 (on capture) which will be mentioned below, are adopted by 49 votes in favour and 1 abstention, which means almost unanimously, see Institut de droit international 2015, pp. 359–360. On the other hand, the whole resolution is adopted unanimously, p. 370.

39 Dromgoole 2016, pp. 189–190. For some papers indicating that the sovereign immunity continues after the vessel sunk, see Institut de droit international 2015, p. 295; Aznar-Gomez 2003, p. 83; Oyama 2021, Stockton Center for International Law 2024, p. 2-17; von Heinegg 2018, p. 131; Tuckett 2025, p. 75; Forrest 2019, pp. 141–146.

40 Declarations of maritime States such as Spain, the United States, and the USSR concerning sunken warships evoke such a comment. See Vadi, pp. 261–262; see also They 2016, p. 57 and declarations cited in *supra* note 37.

41 Dromgoole 2016, p. 190; They 2016, p. 477.

42 Institut de droit international 2015, p. 372.

43 See Bederman 2000 for an article—written before the signature of the UNESCO Convention—arguing that the express abandonment rule did not extend to international custom. In the same vein, They 2016, p. 528.

44 See Institut de droit international 2011, pp. 145–151 for the examples of State practice on sunken warships in the preliminary report: *Orient, Alabama, HMS Birkenhead, Old Dutch Shipwrecks, the Glomar Explorer* affair, *Erebus and Terror, HMS Spartan, Sciré, U-boat 171, U-boat 859, HMS Sussex, La Belle, Le Corosol, Nuestra Señora de Atocha, Sea Hunt* Case, *Nuestra Señora de las Mercedes* (known as Black Swan case or Odyssey Final Judgment).

immunity of the flag State and the sovereignty of the coastal State, the property rights of the flag State continue to exist and prevail even when recovery of the wreck falls within the jurisdiction of the coastal State. On the one hand, the abundant examples of State practice demonstrate that agreement and cooperation between the coastal State and the flag State have been key elements in resolving earlier disputes.<sup>45</sup> On the other hand, this principle of sovereign immunity and property rights, which is nearly of customary nature,<sup>46</sup> is not absolute. In addition to abandonment, relinquishment, or other forms of transfer of title, the capture or surrender<sup>47</sup> of a warship in an armed conflict at sea constitutes a specific mode of transfer of title under the law of naval warfare, which will be examined in the following section.

### 1.3. Capture as a Mode of Transfer of Title Over Wrecks of Warships

Capture as a mode of transfer of the flag State's title over the wreck of a warship, reflects the influence of the law of armed conflicts—formerly known as the law of war—on the law of the sea.<sup>48</sup> This long-standing customary norm is stated in Article 6 of the Resolution, titled “Armed conflict at sea,” as “*wrecks of captured State ships are the property of the captor State if the capture occurred in accordance with the applicable rules of international law*”. Accordingly, State practice concerning capture of warships in naval warfare, as well as the determination of what constitutes a valid capture, becomes crucial.<sup>49</sup> The scope of capture as a mode of transfer of title was extensively discussed during the *travaux préparatoires* of the IDI.<sup>50</sup> This section examines capture in two subsections: first, the definitions of capture, and second, the relevant State practice, which will later guide the application to the AE2 submarine wreck.

45 See the cases, HMS *Terror* and *Erebus*, *La Belle*, *The Old Dutch Shipwrecks*, *The Birkenhead*, *CSS Alabama*, Aznar-Gomez 2003, pp. 77–81; see Garabello and Scovazzi (eds.) 2003, pp. 254–266, for the texts of bilateral agreements.

46 Although the jurists of IDI considered the rule sufficiently established for customary nature, objections still appear in the literature. See They 2016, pp. 475 and 513, for a contrary view: qualifying sovereign immunity as a dogma without legal basis and arguing that the positions of major maritime States represent *de lege ferenda* rather than *opinio juris*, and that the practice is not general enough to constitute a customary norm.

47 Roach 2015, para. 19; Stockton Center for International Law 2024, p. 2-18; Forrest 2019, p. 82; Aznar-Gomez 2003, p. 84.

48 The relationship between the law of the sea and the law of naval warfare is also examined through the lens of complementarity, with the latter being considered a *lex specialis complementa*. See Tuncer 2024, pp. 269–271. Because capture is, by its nature, an act of war between belligerents, the *lex specialis* character of the law of naval warfare restricts the application of the law of the sea in the context of capture and, consequently, limits the complementarity between the two branches. To the same effect, see also von Heinegg et al. 2025, pp. 3 and 73, concluding that “*the law of naval warfare is lex specialis and prevails over the peacetime international law of the sea as reflected in UNCLOS.*”

49 In this regard, the Newport Manual on the Law of Naval Warfare notes that “*if it is lawful to target a vessel or aircraft, it is also lawful to capture it instead*”; see von Heinegg et al. 2025, p. 177.

50 See Institut de droit international 2015.

### 1.3.1. Definitions of Capture

Firstly, before diving into the State practice on this matter, some definitions of capture should be provided. It is observed that these definitions have been formulated in both a narrow and a broad sense. As an important early 20<sup>th</sup> century document, the 1913 Oxford Manual of the Laws of Naval War of the IDI defined capture as “*the act by which the commander of a warship substitutes his authority for that of the captain of the enemy ship, subject to the subsequent judgment of the prize court as to the ultimate fate of the ship and its cargo.*” It should be noted that, as an established rule in prize law, unlike merchant ships, the capture of warships does not require a judgment of the prize court, as title automatically passes to the captor State upon capture, with sovereign immunity attaching as a consequence of the transfer of title.<sup>51</sup> While the capture of enemy merchant ships is governed by prize law, that of warships falls under the law of booty. Booty in warfare is understood as consisting of “*enemy movable property that, under customary international law, may be captured on the battlefield by a belligerent party in an international armed conflict.*”<sup>52</sup> This concept applies to armed conflicts both on land and at sea.<sup>53</sup>

As the definitions of capture and seizure from the relevant period are closely interrelated, the definition of the latter should also be noted. The 1913 Oxford Manual defines seizure, when applied to a ship, as “*the act by which a warship takes possession of the vessel detained, with or without the consent of the captain of the latter. Seizure differs from capture in that the ultimate fate of the vessel may not be involved as a result of its condemnation.*”<sup>54</sup> Moreover, Oppenheim’s International Law provides another definition of seizure: “*Seizure is effected by securing possession of the vessel through the captor sending an officer and some of his own crew on board the captured vessel. But if this is for any reason impracticable, the captor orders the captured vessel to lower her flag and to steer according to his orders...*”<sup>55</sup>

In the Manual’s definitions of capture and seizure, the “substitution of authority” emerges as the key element of the former, while physical possession characterizes the latter. Both physical possession and the intention to capture have been regarded as necessary elements to constitute a capture.<sup>56</sup> However, the close relationship between capture and seizure demonstrates that a strict definition of capture limited solely to physical possession would be inadequate. Consequently, broader definitions

51 Kraska 2009, para. 30; Dinstein 2015, par. 6; They 2016, p. 518; von Heinegg et al. 2025, p. 177.

52 Dinstein 2015, para. 1; Downey Jr. 1950, p. 191, that “*it has long been a basic principle of the international law of war that enemy public property captured on a battlefield becomes the property of the capturing Power.*”

53 Dinstein 2015, para. 10. It should be noted that the right of capture is considered among the belligerent rights exercised at sea by warships and military aircraft; see von Heinegg et al. 2025, p. 41.

54 See the Preamble of the 1913 Oxford Manual of the Laws of Naval War. Respectively for texts in English and French see ICRC International Humanitarian Law Database n.d., Manual... and Institut de droit international 1913.

55 Oppenheim 1906, p. 191.

56 Roach 2015, para. 12; von Heinegg 2018, p. 133. Definitions looking only for the intention to retain the movable property are also observed, Dinstein 2015, para. 6.

of capture were developed in the literature of the early 20<sup>th</sup> century. The British publicist of the law of the sea, Colombos, emphasizes “submission to the will of the captor” as the decisive element in the definition of capture. He illustrates this through examples of what constitutes a legal capture: “*The general principle governing the capture of a vessel as between the captor and the captured ship appears to be that capture is complete when the vessel submits to the will of the captor, and this may be done without necessarily placing a prize crew on board. The fact that the vessel is compelled to steer in the direction indicated by the captor, or to lie to and await for orders showing a submission to the captor, amounts to a legal capture. So does the attack on an enemy ship obliging her to run into the port of an ally. Lord Stowell held in La Esperanza that an act of taking possession was not indispensably necessary to make a capture: obedience to a hostile attack or hostile force, known to be hostile, was sufficient. Moreover, an act of conscious volition by the captor is not necessary...*”<sup>57</sup>

Similarly, in her doctoral thesis, They, by citing a general definition of capture as “*requisition and assumption of control over the vessel by the naval force of the adversary with the purpose of seizing, capturing, retaining, or destroying the vessel*”, concludes that capture is completed once the vessel is subject to the will and control of the captor.<sup>58</sup>

When combined with the surrender of the crew, legal capture becomes particularly relevant for title over wrecks of warships. In several legal texts, including the US declaration on the *Sea Hunt* case,<sup>59</sup> it is observed that surrender is linked to the mode of transfer of title by capture in armed conflict. Although the IDI’s 2015 Resolution did not expressly mention surrender in Article 6 on capture, the limited State practice involving warships sunk after surrender but without being captured should be considered a key factor in this matter. Interestingly, Forrest’s comprehensive book on WWI wrecks cites the *Emden* case as an example illustrating the connection between capture and surrender: “*The Emden was so badly damaged by HMAS Sydney that it was beached and its crew then captured. The wreck itself was subsequently condemned as prize. From the judgment, it appears that the surrender of the crew also, by implication, meant the surrender of the wreck itself.*”<sup>60</sup>

Additionally, Dromgoole asks whether deliberate scuttling to avoid capture amounts to abandonment of title or not and answers that the abandonment of the vessel does not necessarily equate to abandonment of the property interest.<sup>61</sup> However, cases involving surrender of both crew and ship should be treated differently. The particular situation of the *AE2* submarine wreck will be examined in this context in the second part.

<sup>57</sup> Colombos 1959, p. 715.

<sup>58</sup> They 2016, p. 518.

<sup>59</sup> Aznar-Gomez 2003, pp. 83–84.

<sup>60</sup> Forrest 2019, p. 85.

<sup>61</sup> Dromgoole 2016, p. 191, note 43.

### 1.3.2. State Practice Regarding Capture

Secondly, the State practice examined by the IDI—namely, four cases—should be briefly noted. These cases, cited as examples of armed conflict at sea and the transfer of title by capture, are the CSS *Alabama*, *U-boat 859*, *Admiral Nakhimov* and *Re d'Italia*.

The first case concerns the wreck of the CSS *Alabama*, a Confederate privateer sunk during the American Civil War by USS *Kearsage* off the port of Cherbourg, then on the high seas but later falling under French territorial waters.<sup>62</sup> The USA claimed ownership of the wreck as the flag State, which had not abandoned or transferred its rights;<sup>63</sup> however, this claim was based not on the fact that its battleship destroyed the *Alabama* during a military engagement, but as successor of the Confederate States of America.<sup>64</sup> While asserting its property rights, the USA still recognized the legitimate rights of France due to the wreck's location. The issue was ultimately resolved by an agreement in 1989 between the USA and France, which did not explicitly address ownership,<sup>65</sup> but granted France the right to establish a protective zone around the wreck and to take appropriate conservation measures.<sup>66</sup> This case is significant in terms of recognizing the rights of the coastal State in its territorial sea, even though it was not a party to the civil war.<sup>67</sup>

The second case concerns the *U-boat 859*, sunk in the Strait of Malacca in 1944 during World War II, which became subject to a ruling of the High Court of Singapore. The High Court stated that the submarine remained German property “since it was not captured by the enemy before sinking,” thus confirmed the customary rule on the transfer of title by capture. Notably, in this case, there was no claim from the State that sank the submarine, whether the USA or the UK.<sup>68</sup>

The third case, on the other hand, is considered one of the most relevant examples of capture in armed conflict at sea. The *Admiral Nakhimov* was a Russian military vessel sunk in the Strait of Korea after being captured by the Japanese Navy during the Russo-Japanese War of 1905. After its discovery by a Japanese private company, the wreck became the subject of dispute between the USSR and Japan in 1980. However, the Japanese Government rejected the claim of sovereign immunity by the USSR on the grounds that the vessel had been captured before sinking and therefore became property of Japan immediately upon capture, without the need for prize adjudication. Japan stated its position as follows: “*Admiral Nakhimov had been captured*

<sup>62</sup> Institut de droit international 2015, p. 303 and Institut de droit international 2011, pp. 145–146.

<sup>63</sup> Roach 1991, p. 382.

<sup>64</sup> Institut de droit international 2011, p. 152. See also They, 2016, pp. 518–519, concerning *United States v. Steinmetz* case (on the CSS *Alabama*), which involved the “constructive possession” argument at first instance and the absence of a ruling on the applicability of the capture rule (also referred to as the *théorie du butin de guerre*) at second instance.

<sup>65</sup> However, the matter that the title over the *Alabama* and its artefacts remained in US was addressed by diplomatic channels before the agreement; see Roach 1991, p. 382.

<sup>66</sup> Institut de droit international 2011, p. 146. See also, Garabello and Scovazzi (eds.) 2003, pp. 261–262.

<sup>67</sup> Institut de droit international 2015, pp. 303–304.

<sup>68</sup> Institut de droit international 2015, p. 304 and Institut de droit international 2011, p. 147 and 152.

by Japanese Navy before it sank [...]. In accordance with international law, the right with respect to the captured enemy warships and property aboard them are transferred immediately and finally to the Captor State, therefore, all the rights of the Russian side with respect to Admiral Nakhimov became extinct at the time when the vessel was captured by Japanese Imperial Navy". IDI *travaux préparatoires* affirmed that Japan's position was in accordance with the law of naval warfare and reiterated that sinking as a result of military intervention without capture does not transfer ownership from the flag State.<sup>69</sup>

In his comments on the latter case, the Croatian jurist Degan argued, in relation to the rules of warfare, that Japan could not capture the *Admiral Nakhimov* before it sank; nevertheless, it was sunk during a regular war. He, thus stated that "sinking of an enemy warship in such a conflict is as good as any formal act of capture, whatever this term means".<sup>70</sup> Degan's position is particularly notable because he consistently objected during the IDI *travaux préparatoires*, to the rule of sovereign immunity in all circumstances,<sup>71</sup> contending that the sinking of a warship in a naval battle "cannot recover sovereign immunity of any State because it was deprived of it before sinking. For these situations there is not an explicit rule of positive international law. In my view such a wreck becomes the property of the State that was entitled to capture it when it was in floatable situation".<sup>72</sup> This line of reasoning is reflected in the final case discussed by both the IDI and the same jurist in a specific article, concerning the Ironclad *Re d'Italia*.

In this final case, a potential future dispute between Italy and Croatia—both parties to the 2001 UNESCO Convention—is examined. The Italian Ironclad *Re d'Italia*, sunk by Austria in the Battle of Vis in 1866 near the island of Vis, now lies within Croatian territorial waters. Although, the battle occurred between Italy and Austria and Croatia did not exist at the time, it is noted that Croatia succeeded Yugoslavia and, prior to that, Austria-Hungary (since 1868). It is firstly argued that warships lose their immunity upon sinking because they cease to function as State organs, and that these sunken ships—including the *Palestro*, sunk in the same battle—became the booty of war of Austria-Hungary by the act of their sinking.<sup>73</sup>

Secondly, Degan highlighted, on the one hand, the scarcity of precise rules concerning the recognition of wrecks of warships as legitimate booty, and on the other hand, the absence of rules requiring formal act of capture for acquisition of ownership, or a presumption of abandonment by acquiescence in the absence of such an act.<sup>74</sup> He distinguished between peacetime and wartime for the application of sover-

69 Institut de droit international 2011, pp. 151–152. See also Aznar-Gomez 2003, p. 73, and von Heinegg 2015, para. 26, noting that capture may be exercised with or without prior battle damage, and that the property related to the *Admiral Nakhimov* passed to Japan by acquisition of control over the Russian warship.

70 Institut de droit international 2015, p. 304.

71 Institut de droit international 2015, p. 272.

72 Institut de droit international 2015, p. 302.

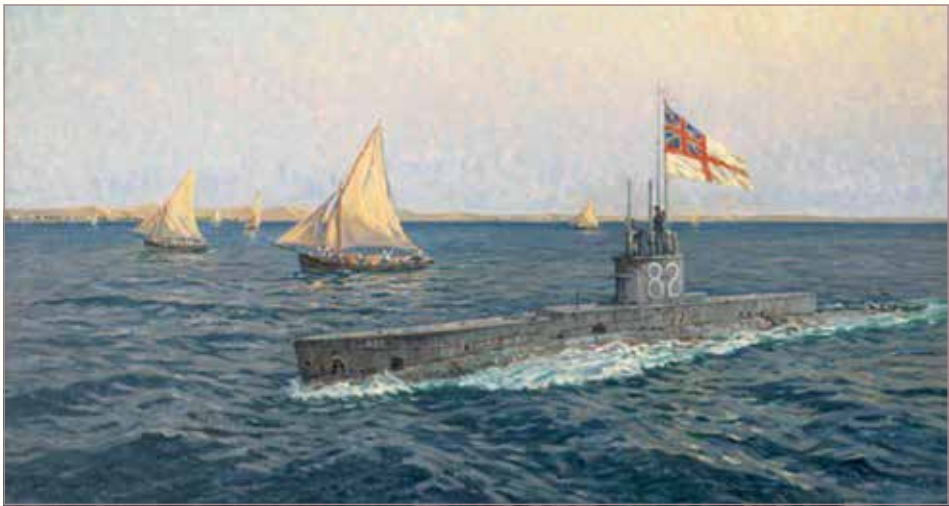
73 Degan 2012, pp. 1–9. See also Institut de droit international 2015, pp. 290–291 for a dissenting perspective on this issue.

74 Degan 2012, pp. 4–5.

eign immunity, arguing that the sovereign immunity of military vessels does not apply between belligerent States. He concluded that Italy lost its entitlement to ownership already during the war of 1866, by having its warship sunk in regular warfare by enemy forces, and that Croatia now possesses the exclusive right to regulate and authorize activities over the wreck without the need for any agreement or approval from foreign States, in light of the UNESCO Convention.<sup>75</sup>

In this regard, a small parenthesis should be opened regarding the argument on the non-application of the rule of sovereign immunity between belligerent States. Indeed, it is accepted that the continuation of the armed conflict entails the suspension of the immunities of warships, or a belligerent right not to respect the rule of sovereign immunity. Accordingly, it is noted that belligerent parties may interfere with wrecks, and even capture enemy wrecks, as long as the armed conflict continues.<sup>76</sup> Thus, this non-application of the rule of sovereign immunity remains valid only during the course of hostilities.

To conclude this section, although it has been argued that mere sinking in a naval battle constitutes a mode of transfer of property rights over a wreck of a warship, this position remains a minority view. The only widely accepted mode of transfer of title in the context of armed conflict at sea continues to be capture or surrender, as examined above. Having established the legal framework governing wrecks of warships situated in territorial seas and internal waters, the next part will apply these rules to the specific case of the *AE2* submarine wreck.



"AE2 in the Sea of Marmara, April 1915", oil painting by Charles Bryant (Australian War Memorial ART09016).

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<sup>75</sup> Degan 2012, pp. 4, 6, 8.

<sup>76</sup> Tuckett 2025, pp. 79–80.

## 2. Legal Status of the AE2 Submarine Wreck

Before examining the legal status of the *AE2* submarine wreck, its historical background should be briefly mentioned. The HMAS *AE2*, one of the two E-class submarines purchased by Australia and the most modern of her time, holds an important place in the foundation of the Royal Australian Navy<sup>77</sup> and, therefore, in the naval history of Australia. Moreover, her extraordinary adventure makes her a lasting legacy of the WWI. After joining the Australian Navy in May 1914 and being sent to the Çanakkale (Dardanelles) Campaign for a new mission in December 1914, the *AE2* began a journey—particularly notable for the *AE1* and *AE2*'s arrival in Sydney, the longest voyage ever made by a submarine—<sup>78</sup> that would determine her fate.

The *AE2* had a strategic mission: she was assigned to attack Turkish ships participating in the defence of the Turkish Straits and then proceed to the Marmara Sea to disrupt the transportation of supplies to the Çanakkale front.<sup>79</sup> It should be noted that the *AE2* was not only the first Allied submarine to penetrate the Çanakkale Strait<sup>80</sup>—successfully accomplishing what had been considered an impossible mission—but also, through her message to Commander-in-Chief Hamilton on the very day a withdrawal operation was being discussed, served as a crucial source of morale and one of the main factors contributing to the prolongation of the Çanakkale land battles by about six months.<sup>81</sup>

Between the beginning of *AE2*'s mission off Bozcaada (Tenedos) Island on 25 April 1915 and her sinking in the Marmara Sea, in Karaburun near Karabiga, on 30 April, six legendary days passed. These days were marked by a submarine hunt carried out by the Turkish torpedo boat *Sultanbisar*. The memoirs of both captains—Stoker and Ali Rıza—despite certain controversies and inconsistencies, remain remarkable and vivid sources for illustrating these events.<sup>82</sup>

On the final day of this extraordinary journey, when the *AE2* arrived to the rendezvous point agreed upon with *E14*—the second allied submarine to pass through the Strait—the chase intensified and turned into a naval engagement between *Sultanbisar* and *AE2*. The *AE2* first encountered a natural phenomenon related to the differing water densities of the Marmara Sea at a depth of approximately 20 metres, which prevented her from diving or surfacing, and was then hit near the engine room, forcing her commander to surrender.<sup>83</sup>

<sup>77</sup> Karaşin 2022, pp. 87–92.

<sup>78</sup> Smith and Özdaş 2015, p. 13; Karaşin 2022, p. 92.

<sup>79</sup> Kolay et al. 2013, pp. 112–113.

<sup>80</sup> Kolay et al. 2013, p. 116.

<sup>81</sup> Bal 2006, pp. 68–71 and Kolay et al. 2013, pp. 117–118.

<sup>82</sup> In this regard, the account of Major Ali Rıza, Commander of the *Sultanbisar*, differs from that of Lieutenant Henry Stoker, Commander of the *AE2*, regarding how the submarine was sunk. See respectively, Brenchley and Brenchley 2003, pp. 124–140, and Dülger 1947, pp. 39–49, for these memoirs. See also, Bal 2006, pp. 71–103, and Başarın's chapter on the stories of both captains in the present book.

<sup>83</sup> Kolay et al. 2013, p. 123.

While Commander Stoker and the crew of HMAS *AE2* surrendered, between surrendering and abandoning the submarine, Stoker nevertheless opened the ballast valves to prevent modern technological vessel from falling into enemy hands. The commander and crew were taken aboard *Sultanhisar* and remained prisoners of war for nearly three and a half years, until the end of the war.<sup>84</sup> However, as the ship was scuttled following surrender, Turkish forces did not, in practice, obtain physical possession of the *AE2*. Besides, in the Turkish naval history documents on WWI, the *AE2*'s loss is recorded as sunk by *Sultanhisar* without any mention of scuttle,<sup>85</sup> which still does not change its legal status as a surrendered warship.

This second part turns to the specific regime and examines in detail the legal status of the *AE2* submarine wreck, applying the legal framework established in the first part, under three sections: its status as underwater cultural heritage, its particular situation as a captured warship, and Türkiye's ownership of and exclusive jurisdiction over it.

### 2.1. *AE2* Submarine Wreck as Underwater Cultural Heritage

When examined in light of the definitions of underwater cultural heritage provided by the UNESCO Convention and the IDI Resolution, there is no doubt that the *AE2* submarine wreck constitutes part of underwater cultural heritage. According to these definitions, as discussed in the first part, the *AE2* submarine wreck is, first, among “*all traces of human existence having a cultural, historical or archaeological character which have been partially or totally under water, periodically or continuously, for at least 100 years such as... vessels...*”<sup>86</sup> Secondly, the *AE2* submarine wreck constitutes “*a sunken State ship which is no longer operational, or any part thereof, including any sunken object that is or has been on board such ship*”.<sup>87</sup> Thirdly, it is equally certain that the *AE2* submarine is a warship—a State vessel/ ship “*used only for government non-commercial purposes*”—<sup>88</sup> that meets the definition of warships in UNCLOS,<sup>89</sup> accepted as reflecting customary international law. Furthermore, as discussed in the first part, whether the 100-year time limit reflects customary international law or not is irrelevant to the *AE2*, as the WWI wrecks already exceed this threshold. Lastly, there is no need to elaborate on the archaeological, historical and cultural importance of the wreck for Türkiye, Australia and humanity in general to demonstrate its character as underwater cultural heritage.

Nonetheless, it is worth briefly noting that the story of the *AE2* submarine also carries an aspect related to the friendship between Australia and Türkiye: the exem-

<sup>84</sup> Kolay et al. 2013, p. 123.

<sup>85</sup> See the book printed by Turkish Navy related to the Çanakkale Naval Campaign: Çanakkale Boğaz Komutanlığı 2015, pp. 7–9. On the other hand, Ali Rıza mentions in his memoirs his decision to ram and clash the submarine before the latter's surrender. Dülger 1947, pp. 41–45.

<sup>86</sup> United Nations 2001, art. 1.

<sup>87</sup> Institut de droit international 2015, p. 371.

<sup>88</sup> Institut de droit international 2015, p. 372.

<sup>89</sup> United Nations 1982, art. 29.

plary humanitarian behaviour shown by Ali Rıza—even at the risk of disobeying orders—in taking the *AE2* crew as prisoners of war and ensuring their safe delivery to the Commandership-in-Chief, which had not previously been designated as the place of delivery.<sup>90</sup> Therefore, the *AE2* submarine wreck is not only archaeologically, historically, and culturally significant for both States, but also stands as a notable example whose unique story paved the way for peace and friendship between the two nations. While the *AE2* may not constitute an outstanding example of underwater cultural heritage in purely archaeological terms, its historical significance substantially reinforces its relevance within the broader framework of underwater cultural heritage. Furthermore, as underwater cultural heritage, the wreck falls within the concept of preservation “for the benefit of humanity,” which is conceptually connected to the broader notion of the common heritage of humankind.<sup>91</sup>

As noted in the first part, nothing in customary international law rejects the concept of underwater cultural heritage, nor do either of the two States object to it, both hosting important wrecks in their waters.<sup>92</sup> The *AE2* submarine wreck’s status as underwater cultural heritage entails several consequences. The most significant of these are reflected in both the general principles of the UNESCO Convention as a primary source and the IDI Resolution as a secondary source, both of which are interpretative texts.<sup>93</sup> These include the obligation of States to cooperate and preserve underwater cultural heritage for the benefit of humanity, the preference for *in situ* preservation as the first option—and, where not feasible, ensuring recovery in accordance with appropriate archaeological practices and proper display—as well as the prohibition of commercial exploitation and the respect for human remains.

Furthermore, although the present chapter focuses on international law, it is worth briefly noting that under Turkish national law, the *AE2* submarine wreck also constitutes a “cultural property,” defined in Article 3 of the Law on the Conservation of Cultural and Natural Heritage as “*movable and immovable property on the ground, under the ground, or under the water pertaining to science, culture, religion and fine arts of before and after recorded history, or that is of unique scientific and cultural value for social life before and after recorded history.*”<sup>94</sup> Pursuant to Article 5 of the same law, such cultural property, including the *AE2* wreck, shall have the quality of State property, therefore immune under international law.<sup>95</sup>

<sup>90</sup> Dülger 1947, pp. 57–69; Bal 2006, p. 106.

<sup>91</sup> Aznar-Gomez 2003, p. 91. This does not mean, however, that underwater cultural heritage is part of the common heritage of humankind; see Aznar 2019, pp. 28–29.

<sup>92</sup> See *supra* note 8 and 10.

<sup>93</sup> See *supra* note 16.

<sup>94</sup> Official Gazette 1983. While Türkiye does not have a specific law on underwater cultural heritage, its general law on cultural and natural heritage also covers wrecks constituting underwater cultural heritage. For an English translation by the Turkish Ministry of Culture and Tourism, see T.C. Kültür ve Turizm Bakanlığı. (n.d.).

<sup>95</sup> Official Gazette 1983; see also Article 23 on movable cultural and natural property to be protected, under which the *AE2* wreck may be classified.

Returning to international law, the recognition of the *AE2* submarine wreck as underwater cultural heritage imposes on States an obligation to cooperate and take the necessary measures to ensure its protection and preservation. While *in situ* preservation is regarded as the preferred option, this does not preclude recovery, particularly when the wreck does not contain human remains. In such cases, the underwater cultural heritage may be recovered for a sound reason, provided that an appropriate pre-disturbance archaeological investigation has been undertaken.<sup>96</sup> Unlike many WWI wrecks, the *AE2* submarine has no connection to a maritime war grave, as her entire crew surrendered and was captured before the ship sank. Accordingly, the complex issues arising from wrecks that serve as maritime memorials or war graves, or that contain human remains do not pose particular difficulties with respect to the recovery of the *AE2*—a matter which will be addressed in the third section, following the section on the *AE2* submarine as a captured warship.<sup>97</sup>

## 2.2. *AE2* Submarine Wreck's Particular Situation as a Captured Warship

Having established that *AE2* submarine wreck forms part of underwater cultural heritage, another important aspect is to examine its particular situation as a captured warship. Although the HMAS *AE2* was not physically possessed during her naval engagement with the Turkish torpedo boat *Sultanhisar*, as she was scuttled between the moment of surrender and the abandonment of the ship, this does not mean that the capture of the submarine was not accomplished. On the contrary, the surrender of the *AE2* constitutes a clear example of legal capture.

It should first be noted that mere sinking during a naval engagement, as reflected in State practice regarding capture, does not constitute capture. In this regard, capture and surrender have been identified, within the context of armed conflicts at sea, as modes of transfer of title, in other words, as a special situation under the emerging customary rule concerning the flag State's continuing property rights over wrecks of warships. More clearly, although State practice on the link between surrender and capture is limited, this specific mode of transfer of title also encompasses surrender. Thus, whether the *AE2* was sunk directly by *Sultanhisar* or scuttled is irrelevant for determining the ownership of the wreck.

Secondly, as examined earlier, several definitions of capture exist in the context of armed conflict at sea—both in a narrow sense, limited to physical possession and the intention to capture, and in a broad sense, focusing on submission to the will of the

<sup>96</sup> Forrest 2019, p. 212. See also Aznar 2018, p. 77, examining *in situ* preservation as an archaeological and legal principle, qualified as a “first option,” but not the only one, and which may therefore be ruled out in certain circumstances, such as the need for better scientific understanding or enhancement.

<sup>97</sup> Another matter that does not fall within the scope of this chapter is the potential qualification of the *AE2* submarine wreck as a threat to the marine environment or navigation, due to the presence of a remaining unexploded torpedo. The issue of potentially polluting wrecks constitutes a subject of current debate in international law. For a discussion on this issue, see Forrest 2019, pp. 176–192; Aznar 2015, pp. 81–88.

captor. Thus, the surrender of the *AE2* and the taking of her crew as prisoners of war by *Sultanhisar* perfectly demonstrate a submission to the will of the captor. In this context, a question arises regarding situations in which a warship is surrendered, but cannot be formally captured due to sinking. In such cases, surrender—by its very nature, signifying defeat and submission to the victor’s and captor’s will—should be considered equivalent to legal capture. Moreover, as observed in the *Emden* case discussed in the first part, “*the surrender of the crew also, by implication, meant the surrender of the wreck itself.*”

Regarding the link between capture and surrender, while commenting on the *Admiral Nakhimov* case, Dromgoole noted that the immediate transfer of property upon capture “*presumably*” also applies “*in the event of the surrender of a vessel before sinking*”.<sup>98</sup> Additionally, she raised a similar question concerning deliberate scuttling to avoid capture, yet without surrender, concluding that the abandonment of a vessel does not necessarily equate to the abandonment of property interest. Accordingly, this reasoning should apply only to cases that do not involve surrender and that concern mere sinking or defeat in a naval engagement.<sup>99</sup>

On the other hand, in the case of the *AE2*, whether due to the natural phenomenon of the varying density in the Marmara Sea or as a result of defeat in a naval engagement, one thing is certain: the *AE2* was forced to surrender, thereby submitting her will to *Sultanhisar*. Moreover, it may be argued that, according to the narrow definition of capture provided by the 1913 Oxford Manual, the substitution of authority—whereby the authority of the *AE2* was replaced by that of the *Sultanhisar*—was effected through the act of surrender and the capture of the crew. In cases involving both scuttling and surrender, the abandonment of the ship should be understood as the relinquishment of both effective control and legal possession as a result of the surrender. By contrast, in cases of scuttling without surrender, the legal transfer of ownership would remain incomplete.

Numerous examples of scuttling can be found in World War I practice.<sup>100</sup> A notable example is the scuttling of the German Fleet at Scapa Flow in British waters, which had been interned by the British following the Armistice. While the ownership of these wrecks has not been examined extensively, it is noted that many of them were salvaged after the war.<sup>101</sup> However, the sale of the ships scuttled at Scapa Flow by the British Admiralty, was categorized in Forrest’s book under wrecks of enemy ships “*where ownership had been transferred by capture or surrender*”.<sup>102</sup> Furthermore, it is noted that only seven wrecks remained, which were later scheduled under the An-

<sup>98</sup> Dromgoole 2016, p. 191, note 43.

<sup>99</sup> See, for instance, the scuttling of the *Admiral Graf Spee* by its crew in Uruguayan waters, in the absence of surrender or naval engagement at the time.

<sup>100</sup> See the example of the scuttle of the German Fleet in Scapa Flow after the Armistice. Forrest 2019, pp. 45–46.

<sup>101</sup> Forrest 2019, p. 81. It is also noted that the salvage of the scuttled German Fleet at Scapa Flow was one of the greatest post-war scrap-metal salvage operation, p. 125.

<sup>102</sup> Forrest 2019, pp. 150–151.

cient Monuments and Archaeological Areas Act 1979, a measure that both protected the site and opened it to diving tourism.<sup>103</sup>

Therefore, according to the view of the present author, surrender amounts to capture. An important consequence of capture concerns property rights. As noted in the first part, according to Article 6 of the IDI Resolution, which holds customary value according to IDI, “*wrecks of captured State ships are the property of the captor State if the capture occurred in accordance with the applicable rules of international law*”. In the context of the surrender and sinking of the HMAS *AE2*, the submarine, by virtue of its surrender, was legally captured by Türkiye—whether regarded as the continuing State or as a successor State of the Ottoman Empire—<sup>104</sup> and thus became a booty of war. Moreover, with respect to World War I prizes and booties, Article 140 of the 1923 Treaty of Peace of Lausanne, by analogy, is applicable to Türkiye’s booties and reads as follows: “*Prizes made during the war between Turkey and the other Contracting Powers prior to the 30 October 1918, shall give rise to no claim on either side...*”<sup>105</sup>

Consequently, ownership and property rights in relation to the *AE2* submarine wreck remain with Türkiye as the captor State, and it therefore enjoys sovereign immunity as Türkiye’s public property. A further aspect, in some respects related to Türkiye’s ownership of the wreck, is its exclusive jurisdiction over the wreck, which is situated in its internal waters and will be discussed in the following section.

### 2.3. Türkiye’s Ownership of and Exclusive Jurisdiction Over the *AE2* Submarine Wreck

Irrespective of who holds ownership of a wreck, the coastal State’s exclusive right to regulate or authorize any activities concerning a wreck of warship located in its internal waters and territorial sea is accepted in customary international law as a by-product of territorial sovereignty.<sup>106</sup> As noted in the first part, Articles 7 of both the UNESCO Convention and the IDI Resolution regulate the situation of wrecks constituting underwater cultural heritage within internal waters and the territorial sea, granting exclusivity to the coastal State, which exercises full-sovereignty over these maritime zones. On the other hand, the tension between the sovereign immunity of the flag State and the sovereignty of the coastal State—also discussed in the first part—is reflected in the express reference to the rule of sovereign immunity in Article 7 of the IDI Resolution.

<sup>103</sup> Forrest 2019, pp. 172–173.

<sup>104</sup> See Öktem 2011 for an article examining Türkiye’s qualification as either a successor State or the continuing State of the Ottoman Empire, arguing that Türkiye qualifies as the latter under the law of State succession.

<sup>105</sup> League of Nations 1924, pp. 108–109.

<sup>106</sup> See United Nations 1982, art. 2(1) and ICJ 1986, para. 212.

Meanwhile, in the case of the *AE2* submarine wreck—located in the Marmara Sea, within Turkish internal waters—<sup>107</sup> this tension does not arise to the same extent, since Australia is no longer the flag State of the *AE2* following its capture by Türkiye. Combined with Türkiye’s ownership of the *AE2*, its exclusive right to regulate activities concerning the wreck thus transforms into exclusive jurisdiction over it. Nevertheless, Australia is undoubtedly a State “with a verifiable cultural, historical or archaeological link” to the *AE2*—a notion reflected in Article 7 of the UNESCO Convention.<sup>108</sup> While this latter aspect does not affect Türkiye’s exclusive jurisdiction over the wreck, it nonetheless entails a customary obligation for Türkiye to cooperate with Australia regarding the activities related to it.<sup>109</sup>

Furthermore, it is not subject to significant debate that the obligation of States to cooperate in the preservation of underwater cultural heritage—formulated in Article 303 of UNCLOS, which provides that “States have the duty to protect objects of an archaeological and historical nature found at sea and shall cooperate for this purpose”—has attained a customary character, notwithstanding the fact that its scope and extent as a customary norm remain open to debate.<sup>110</sup>

This duty of cooperation is also reflected in Article 15 of the IDI Resolution, which provides: “All States should cooperate to protect and preserve wrecks which are part of cultural heritage, to remove wrecks which are a hazard to navigation, and to ensure that wrecks do not cause or threaten pollution of the marine environment. In particular, States bordering an enclosed or semi-enclosed sea should cooperate in the performance of their duties set out in this Resolution in a manner consistent with the rights and duties of other States.”<sup>111</sup>

On the other hand, the general obligation of cooperation does not necessarily

<sup>107</sup> See Official Gazette 1982 and Official Gazette 1926, respectively: the Turkish Territorial Waters Law, which provides that “the waters on the landward side of the baselines and the waters of bays are Turkish internal waters,” and the Turkish Cabotage Law, which treats the Marmara Sea—together with rivers, lakes, the Straits, and all waters included within internal waters—as part of the “Marmara basin,” thereby reserving navigation and commercial rights in these waters exclusively to Turkish nationals. See also Meray 1968, pp. 367–369, on the notion of internal seas and the classification of the Marmara Sea as an internal sea; and Aybay and Oral 1998, noting that the status of the Marmara Sea as an internal sea of Türkiye was expressly affirmed during the Montreux Conference, without any objection to the contrary.

<sup>108</sup> See Aznar 2019 for a paper examining the notions of preferential rights, interest of States, and verifiable link in respect of underwater cultural heritage.

<sup>109</sup> See Forrest 2019, pp. 231–233, for the scope of international cooperation related to the WWI wrecks.

<sup>110</sup> See Aznar 2019, p. 22 and ICJ 2025, para. 140, considering that “that the duty of States to cooperate for the protection of the environment is a rule whose customary character has been established.” Although the possibility that such conduct is dictated rather by courtesy complicates this conclusion, see They 2016, p. 538, two articles in the general provisions of UNCLOS that may reflect customary international law should be noted: Article 300, titled “Good faith and abuse of rights,” and Article 303(1). Commenting on the obligation of cooperation in Article 303, Scovazzi 2009, para. 6, argues that “persistently disregarding any request by other States to negotiate on forms of cooperation aiming at the protection of underwater cultural heritage” will entail the international responsibility of a State. Similarly, They 2016, p. 543, examines the application of Article 300 in light of Article 303, thereby linking the obligation to cooperate with the principles of good faith and the theory of abuse of rights.

<sup>111</sup> Institut de droit international 2015, p. 374.

mean that the coastal State is obliged to inform every step related to activities on the wreck.<sup>112</sup> Interestingly, it is observed that coastal States show a tendency to cooperate with States that have a verifiable link when the latter refrain from insisting on recognition of their property rights and simply show concern for participating in the preservation of the wreck.<sup>113</sup> This appears to be the case in the preservation efforts of the *AE2* submarine wreck.

In practice, cooperation may take various forms, and in the activities concerning the wreck that Türkiye has regulated, it has provided a notable example of cooperation with Australia, including projects on preservation, education and public awareness related to the *AE2*. In this regard, joint Turkish-Australian archaeological activities from the very beginning—following the wreck’s discovery in 1998—stand out, particularly the cooperation on the 2007 and 2014 *Silent Anzac* projects initiated by the former Australian *AE2* Commemorative Foundation in collaboration with TINA The Turkish Foundation for Underwater Archaeology.<sup>114</sup> While comprehensive archaeological activities focusing on the documentation and recording of the wreck were carried out as a first stage,<sup>115</sup> public awareness initiatives—such as narrating the story of the *AE2* and *Sultanbisar* and installing reliefs illustrating this shared history across various locations in both Australia and Türkiye—have continued simultaneously.<sup>116</sup>

An important consequence of Türkiye’s ownership of and exclusive jurisdiction over the wreck lies in its right to recover it and to determine the manner of its preservation. As mentioned in the first section of the second part, no additional legal obstacle exists to the recovery of the wreck, as it does not contain any human remains. Accordingly, Türkiye may recover the wreck and preserve it in a museum—including its internal artefacts—or adopt an alternative approach, such as the proposal by Selçuk Kolay, the underwater researcher who discovered and located the wreck, to install it “*into a specially built pool with fresh water on long term desalination*” at Kilye Bay, an economically viable method consistent with archaeological and preservation principles.<sup>117</sup>

In this regard, it should be noted that the Rules set out in the Annex to the UNESCO Convention, although of a soft-law nature, are generally regarded as reflecting a regime of sound archaeological practice.<sup>118</sup> The preservation methods previ-

<sup>112</sup> It is the political sensitivity in this context that has led to a balanced regime in Article 7 of the UNESCO Convention. Forrest notes that the exhortation in Article 7 to inform the flag State concerns only the discovery of the wreck, and not the activities directed at such wreck. Forrest 2019, p. 227. See also *supra* note 110.

<sup>113</sup> See the example of HMS *Birkenhead* between UK and South Africa in They 2016, pp. 539–540. They, p. 554, concludes that the examination of the discretionary power of the coastal State seems to result in the absence of a customary obligation under public international law to return cultural property to its country of origin.

<sup>114</sup> See Smith 2008, p. 4 and Smith and Özdaş 2015, pp. 19–21. See also Briggs’s chapter on the *Silent Anzac* Project in the present book.

<sup>115</sup> Smith and Özdaş 2015, p. 30. See also Smith’s chapter in the present book.

<sup>116</sup> See Başarın and Başarın 2009, pp. 172–174.

<sup>117</sup> See Kolay’s chapter on the discovery and the future of the *AE2*’s wreck in the present book.

<sup>118</sup> Forrest 2019, pp. 212–214. Boesten 2002, pp. 132–133. In this context, Article 7 of the UNESCO Convention obliges State parties (not applicable for Türkiye and Australia) to apply the Rules by stating that “*With-*

ously applied to the *AE2* wreck—despite Australia and Türkiye not being State parties—were in harmony with the principles of the UNESCO Convention, and have been recognized as an international example of best-practice cultural heritage management.<sup>119</sup>

Furthermore, as a consequence of both Türkiye’s ownership of and exclusive jurisdiction over the wreck, an international obligation not to deliberately prejudice its preservation arises.<sup>120</sup> In this context, two events should be noted. The first was TUDAV’s (Turkish Marine Research Foundation) 2006 application to the Ministry of Agriculture and Forestry to close off the area surrounding the *AE2* wreck, to fishing activities, which was approved. Accordingly, fisheries operations in the wreck zone were banned under Fisheries Circular No. 37/1 issued the same year.<sup>121</sup>

The second notable event was the raising of a parliamentary question in 2021—the unique example in Turkish parliamentary history that such a wreck became the subject of parliamentary discussion—regarding the current situation of the wreck and the intention to display it in Çanakkale or Gelibolu (Gallipoli).<sup>122</sup> In its response, the Ministry of Culture and Tourism noted that various documentation works had been carried out under the authorization of the Turkish General Staff and the Ministry of Foreign Affairs in 1998, 2014, and 2020, including the production of a joint documentary film with Australia.<sup>123</sup>

Additionally, the Ministry’s response highlighted the recent opening of the Gallipoli Historical Underwater Park in 2021 to diving tourism, marking it as the first underwater park dedicated to WWI.<sup>124</sup> In this context, it should be noted that the *AE2* occupies a unique position among Çanakkale Campaign wrecks: it contains no human remains and remains largely undisturbed at a depth of 72 metres in the Marmara Sea,<sup>125</sup> distinguishing it from other wrecks in the Strait. These factors endow the *AE2* with considerable historical and archaeological value, favouring its recovery over *in situ* preservation or potential opening to diving tourism.

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*out prejudice to other international agreements and rules of international law regarding the protection of underwater cultural heritage, States Parties shall require that the Rules be applied to activities directed at underwater cultural heritage in their internal waters, archipelagic waters and territorial sea.* See United Nations 2001, art. 7.

**119** Smith and Özdaş 2015, pp. 16 and 21.

**120** Scovazzi 2009, para. 6, notes that “a State which knowingly destroys, or allows the destruction of, elements of underwater cultural heritage can be held responsible for a breach of the obligation to protect it”; although stated in the context of Article 303 of UNCLOS, this reasoning should also apply to non-party States as a customary norm.

**121** Official Gazette 2006, p. 18. For more detail, see Öztürk’s chapter on *AE2* and protection measures in the present book.

**122** See TBMM n.d. for the written question addressed to the Ministry of Culture and Tourism by Emine Gülizar Emecan, former Member of the Grand National Assembly of Türkiye; see also Öztürk 2023, pp. 109–112.

**123** See Öztürk 2023, p. 111.

**124** See Gallipoli Historical Underwater Park n.d. For further details on the tourism aspects of the Gallipoli Campaign shipwrecks, the underwater park, and the Directorate of the Gallipoli Historical Site, see Boz 2023, pp. 20–26.

**125** See Kolay et al. 2013, p. 112.

## CONCLUSION

To conclude, the HMAS *AE2* Submarine, as a unique archaeological and historical legacy of World War I, continues to shape Australia-Türkiye relations. In this regard, in case of its recovery, setting an example as the first WWI submarine opened for cultural visits, the *AE2* would make an exceptional contribution to world naval history. Moreover, the legal status of the *AE2* submarine wreck discussed in the present chapter may serve as an important future case concerning State practice, thus contributing to the crystallization of the customary international law on the legal regime of wrecks of warships situated in territorial seas and internal waters—both for the transfer of the flag State’s property rights over such wrecks by capture and the cooperation between the coastal State and the former flag State.

In the context of capture, the *AE2* may additionally fill gaps in the link between surrender and capture for determining ownership of wrecks of warships. According to the present author’s view, as explained above, the surrender and capture of the crew amount to the capture of the warship. Consequently, the sovereign immunity of the flag State over the *AE2* wreck remains in Türkiye, as Australia lost its flag State title and property rights following surrender and capture. Therefore, the coastal State, Türkiye, as the captor State, holds both ownership and exclusive jurisdiction over the wreck.

Nonetheless, Türkiye remains under an obligation to cooperate for the preservation of the wreck as part of underwater cultural heritage. Previous works carried out, demonstrate a notable example of cooperation between Türkiye and Australia in preserving the *AE2* submarine wreck. Neither Türkiye’s exclusive jurisdiction nor its ownership of the wreck precludes continuation of cooperation between the two States. At the same time, the obligation of cooperation—reflecting customary value—<sup>126</sup> does not impose a duty to inform the former flag State, or a State with a verifiable link, of every step in the activities concerning the wreck, nor does it require joint management.

Furthermore, the story of the *AE2* and the *Sultanhisar*, particularly the memoirs of both captains, underscores the friendship between the two nations that began following the Çanakkale Campaign. While Türkiye holds property rights over the wreck due to its capture, Australia constitutes a State with a verifiable archaeological, historical, or cultural link. Therefore, agreement and cooperation between States are always welcome and are positive both for the preservation of the *AE2* submarine wreck as underwater cultural heritage and for the future of Turkish-Australian relations.

As a last word, the lessons for the humanity from the Çanakkale Campaign and WWI should never be forgotten. As Mustafa Kemal Atatürk, the hero of the Çanakkale Battles and the founder of the Republic of Türkiye, said: “*Whatever the case may be, I am not in favour of dragging the nation into war for this or that reason. War must be necessary and vital. My true conviction is this: I should not feel remorse in my conscience*

<sup>126</sup> See *supra* note 110.

when I lead the nation into war. We can go to war saying “we will not die” against those who say “we will kill.” However, unless the nation’s life is in danger, war is a murder.”<sup>127</sup> The shipwrecks of the Çanakkale Campaign, including the *AE2* exemplify a war that now stands as a lesson for peace between nations. Accordingly, in case of recovery, the *AE2*’s place remains with her companions beneath the sea. Preserving the *AE2* in Türkiye seems the best solution for maintaining the integrity of the Gallipoli Historical Site, both on land and at sea—a peninsula that continues to carry the silence of sorrow and the enduring lessons of history for humanity.

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## OCEANOGRAPHIC CHARACTERISTICS OF THE ÇANAKKALE STRAIT AND THE ENTRANCE TO THE MARMARA SEA

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### ABSTRACT

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This article examines the oceanographic conditions of the Çanakkale Strait between 25–30 April 1915, during the submarine *AE2*'s passage through the strait. The Strait exhibits a two-layered stratification system, with a brackish upper layer (18 psu) and a highly saline lower layer (38.5 psu), separated by a sharp density interface. Temperature and salinity data from the MARMOD database indicate that the upper layer was approximately 18–30 meters thick during late April, with the cold intermediate layer present in the Marmara Sea. Historical records from Captain Stoker show that *AE2* navigated primarily in the upper layer at depths of 6–24 meters. The strong lower-layer currents that Stoker encountered were stronger than anticipated, posing significant challenges for the submarine's passage.

### Keywords

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Çanakkale Strait, Hydrography, Temperature, Salinity

## INTRODUCTION

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**T**his article reviews the oceanographic conditions of the Çanakkale Strait and its exit to the Marmara Sea between 25 and 30 April 1915, when the submarine *AE2* passed through the Strait before sinking.

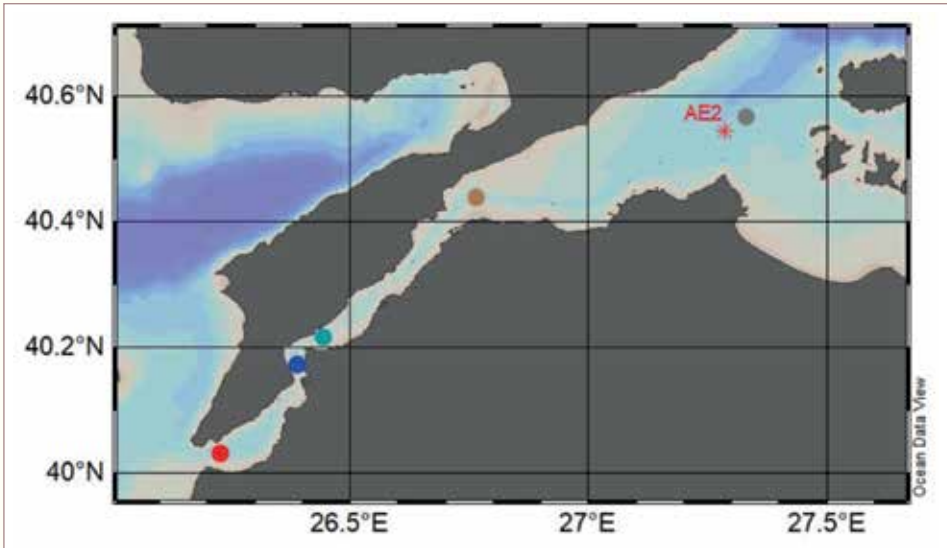
Captain Stoker described the challenges of navigating the Çanakkale Strait: “The Strait was thirty-five miles long, and had a continuous current running out into the Mediterranean at a rate of from three to five knots. The total distance an E-class submarine could dive was fifty miles through the water, and it was doubtful if this distance would be sufficient to carry her through the Strait against the current. A rise to the surface in the Strait would mean instant destruction by gunfire.” He also noted that the internal currents in the deep saltwater south of the Nara Pass were stronger than expected. The two-layered current system of the Turkish Straits System was first documented by Marsilli in the late 17th century. By the early 20th century, systematic hydrographic measurements employing Nansen bottles and reversing thermometers had become standard practice, with extensive oceanographic expeditions conducting observations throughout the Mediterranean basin and its adjacent seas, as well as in the world’s oceans. Such measurements were conducted in the Çanakkale Strait during the 1908–1910 expedition aboard the research vessel *Thor*, led by Danish marine biologist Schmidt. Nielsen’s (1912) analysis of these observations revealed that Mediterranean water in an almost unmixed state flows through the Dardanelles into the Marmara Sea because a maximum salinity of nearly 38.5 ppt was found about 100 meters deep. The interface depth between the opposing currents in the Çanakkale Strait—a phenomenon long familiar to regional mariners—exhibits considerable temporal variability independent of tidal forcing (Nielsen 1912). Prior to World War I, sufficient oceanographic knowledge of the Çanakkale Strait had been acquired to assess the feasibility of submarine transit through the waterway.

According to records from both Stoker and Rıza Bey, the captain of the *Sultanhisar* torpedo boat, the weather between 25 and 30 April 1915, was calm in the early mornings with clear skies during the day (Stoker 1925; Dülger 1947). This article examines the oceanographic conditions at the Dardanelles and the entrance to the Marmara Sea under similar weather conditions. The Çanakkale Strait, part of the two-layered and highly dynamic Turkish Straits System (TSS), has been the subject of numerous studies. Temperature and salinity measurements taken in late April were obtained from the MARMOD database and are evaluated in this study.

## OCEANOGRAPHIC CONDITIONS

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The Çanakkale Strait has a length of nearly 62 km. Its width varies from 1.3 to 7 km, with an average width of 4 km. The Strait connects to the Marmara Sea through a



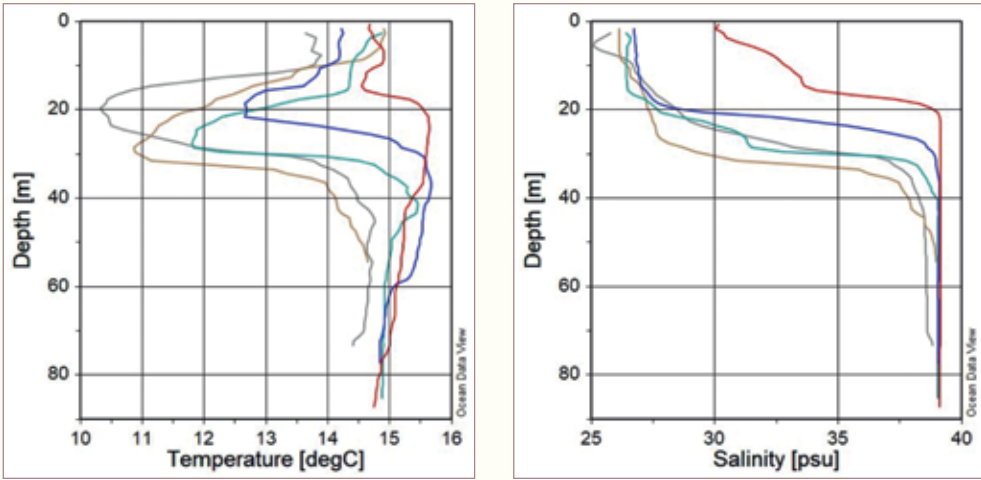
**Figure 1.** The bathymetry of the Çanakkale Strait and its exit region to the Marmara Sea. Red star indicates AE2 submarine wreck. Yellow, blue, brown and red dots denote station locations which given temperature and salinity profiles.

gradually widening and deepening section to the southwest (Fig. 1). A triangular-shaped submarine canyon is located in this gradually deepening area. This canyon reaches 70 m depth at the Çanakkale exit and connects to the deep Marmara basin.

Turkish Strait System (TSS) has a two-layered stratification between the Black Sea and the Aegean Sea. The upper layer originates from brackish waters with a salinity of 18 psu, while the lower layer originates from highly saline waters with a salinity of 38.5 psu. The salinity of the upper layer increases gradually from the Black Sea to the Aegean, with the highest rate in the southern part of the Istanbul Strait and the western part of the Çanakkale Strait due to hydraulic adjustments. A sharp density interface is observed in the Marmara Sea at a depth of 25 meters. The largest slopes of the interface separating the upper and lower layers, carrying waters typical of the Black Sea and Mediterranean Sea, occur in the two straits (Ünlüata et al. 1990; Beşiktepe et al. 1994).

Figure 2 shows superimposed temperature and salinity profiles at the Aegean exit of the Çanakkale Strait, the Nara Passage, the Marmara Sea entrance, and near the AE2 submarine wreck. These profiles were measured on 30 April 1995.

All temperature and salinity profiles in the Çanakkale Strait and Marmara Sea exit indicate two-layer stratification. The interface depth is approximately 18 m at the entrance to the Aegean Sea and deepens to 30 m in the Marmara Sea. The Nara Passage is characterized by its particularly sharp interface.



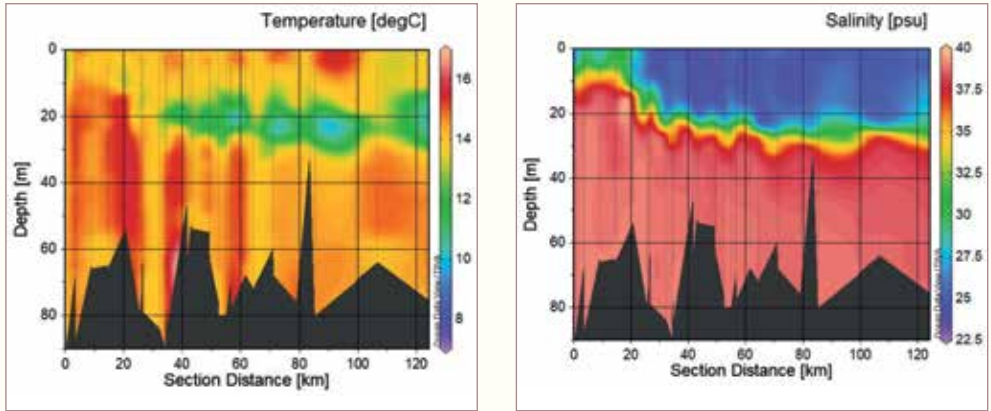
**Figure 2.** Temperature (a) and salinity (b) profiles at the Aegean exit of the Strait (red line), South of Nara section (blue line), North of Nara section (green line), Marmara exit of the Strait (brown line) and close to the AE2 submarine wreck (grey line).

The temperature structure exhibits a two-layered configuration featuring a distinct cold intermediate layer situated between the warmer surface waters. Temperatures are nearly equivalent at similar depths across all profiles. This cold layer exhibits an increase in temperature ranging from approximately 11 to 15°C as it transitions from the Marmara Sea to the Aegean Sea.

Cross-sections of temperature and salinity measurements along the trajectory from the Aegean Sea entrance to the site of *AE2*'s sinking facilitate understanding of the environmental conditions in which the submarine manoeuvred. These transects (Figure 3) were prepared using temperature and salinity data from the MARMOD database, covering the period 15 days before and 15 days after 30 April (15 April to 15 May).

The temperature transect reveals the presence and extent of the cold intermediate layer in the Marmara Sea between 15 April and 15 May. As indicated by the temperature profiles, the upper layer had begun to warm due to atmospheric influence, with temperatures ranging from 14 to 16°C. The lower layer exhibited a higher temperature, ranging from 15 to 16°C. The cold intermediate layer reaches the narrowest part of the Strait and subsequently disappears due to the mixing of water towards the Aegean Sea.

The salinity transect displays an increase in salinity, indicative of mixing, in the upper layer from the Nara Passage to the Aegean Sea exit. The average thickness of the upper layer becomes thinner from the Marmara entrance to the Aegean exit. It was approximately 25 meters thick near the Marmara Sea and approximately 10 meters thick near the Aegean Sea.



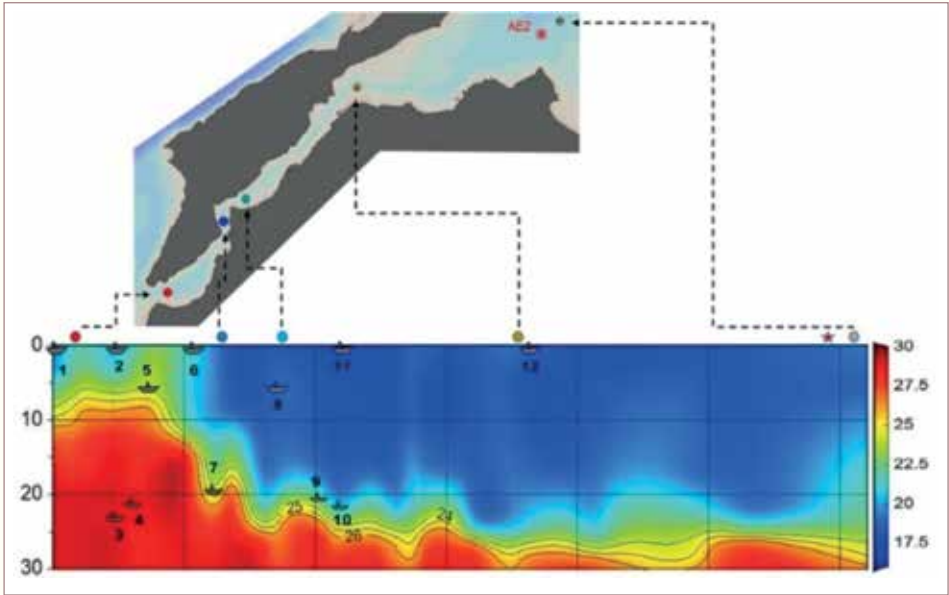
**Figure 3.** Temperature (a) and salinity (b) transects.

According to Jarosz et al. (2012), the data indicates variability in flow speeds and layer thicknesses, both monthly and seasonally. In the northern section, the upper-layer flow reached a maximum of approximately 50 cm/s during late spring and summer, while the lower layer flow exhibited higher mean values in autumn and late summer. The upper layer began to deepen in January and thickened to a depth of 25–30 m between February and May. The upper layer was approximately 22 m thick on average for the rest of the year. The upper layer of the southern Dardanelles had the fastest currents (>70 cm/s) in spring. The lower layer had higher mean velocities (>30 cm/s) in fall and summer (Jarosz et al. 2012).

## DISCUSSION AND CONCLUSION

Stoker's book *Straws in the Wind* describes *AE2*'s navigation through the Dardanelles. According to Stoker, the *AE2* entered the Strait from the surface and, after passing Kepez, dived to a depth of 24 meters as a safety measure, then moved to 21 meters. Subsequently, the submarine ascended to a periscope depth of 6 meters to obtain a clear view of the surroundings, especially at the sharp turn of the Strait. To pass through the area densely populated by mines and warships, the submarine descended to 24 meters. After advancing for a while, it ascended again to 6 meters to assess the situation and confirmed it had passed Nara Cape (Figure 4, Table 1).

In his book, Stoker observed that the lower layer current was stronger than anticipated. To avoid detection by warships, the submarine descended to 21 meters and remained there for approximately 16 hours. At 21.00, *AE2* surfaced to recharge her batteries. In the wider area of the Strait, the submarine advanced at periscope depth, reaching the Marmara Sea on the morning of 26 April 1915.



**Figure 4.** AE2's navigation in the Çanakkale Strait was overlaid with density stratification from 15 April to 15 May. Numbers are explained in Table 1.

	Depth/Position/Hour
1	Surface/Entrance to the Çanakkale Strait/2.30
2	Surface/at Kepez point/3.30
3	24 m depth/ /
4	21 m depth/ /
5	6 m (Periscope depth)/ at Kilitbahir/4.30
6	Surface/at the 300 yard at the south of the Nara Pass/
7	21 m depth/at the Nara Pass
8	6 m depth/north of the Nara Pass/6.45
9	21 m depth/rest at the bottom/8.30
10	21 m/continue rest at the bottom/19.00
11	Surface/ /21.00
12	Surface/Marmara exit of the Çanakkale Strait/9.00

**Table 1.** The depth, location, and time information correspond to the numbers shown in Figure 4.

Determining the precise thickness of the upper layer in April 1915 presents a considerable research challenge. However, analysis of temperature and salinity profiles obtained as snapshots indicates that the upper layer thickness was 18 m in the south and 30 m in the north, while transects indicate depths of 10 and 25 m. Jarosz et al. (2012) also demonstrated that the upper layer was at its thickest in late spring and early summer.

The submarine *AE2*, excluding the period spent waiting at the bottom, navigated south of the Nara Pass at a depth of 24 m, which corresponds to the lower layer. At all other times, the vessel passed through the Strait in the upper layer.

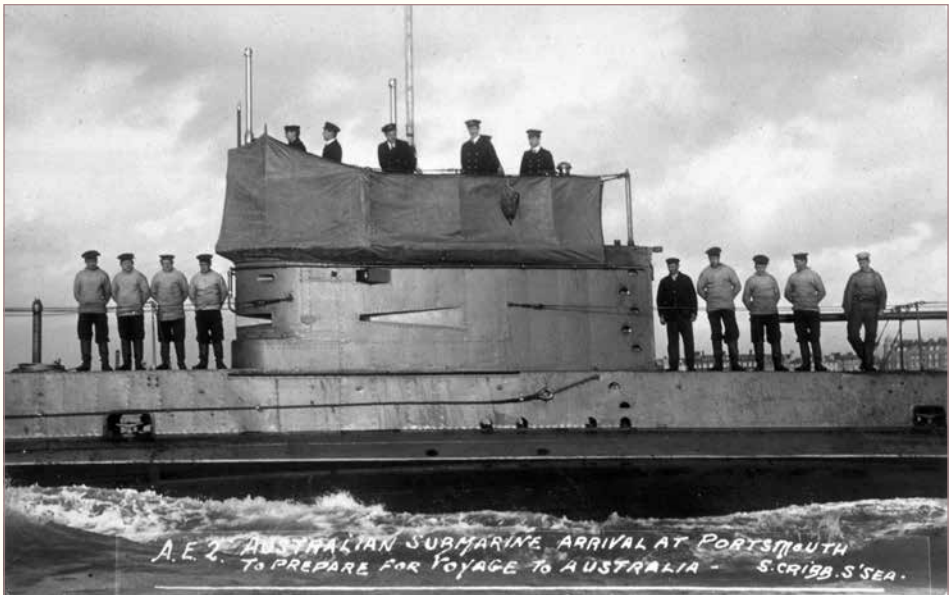
The *AE2*'s successful passage through the Çanakkale in April 1915 demonstrates the practical application of the oceanographic knowledge accumulated prior to World War I. The correspondence between the submarine's location and the estimated upper layer thickness (10–30 m) from today's hydrographic data indicates that sufficient knowledge existed. Stoker's observations of stronger-than-anticipated lower-layer currents validate Nielsen's 1912 findings regarding the dynamic variability of the current interface. These findings emphasize the strategic value of pre-war hydrographic surveys in enabling complex naval operations through the Turkish Straits.

## ACKNOWLEDGEMENTS

I wish to express my gratitude to the Institute of Marine Sciences, Middle East Technical University (IMS-METU) for granting access to the MARMOD database, which provided crucial oceanographic data for this research. Special thanks are due to Vedat Ediger for his expert assistance in improving the visual presentation and effectiveness of Figure 4, which significantly enhanced the clarity of my findings. The English language of this text has been edited and improved by Claude AI.

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AE2 entering Portsmouth.

## AE2 AND PROTECTION MEASURES

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### ABSTRACT

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*AE2* was the first submarine in history that penetrated the Sea of Marmara during the Gallipoli Campaign in 1915. Later, the submarine was detected, surrendered to the *Sultanbisar* gunboat off Karabiga and sank to the sea bottom. The wreck is under protection as a cultural heritage. According to the Fisheries Circular, it is protected since 2006 against any kind of physical damage, which can be made by bottom fisheries.

This wreck is a common cultural heritage of Türkiye and Australia and is in need of protection for the next generations. Long-term monitoring is needed for any kind of damage on the submarine wreck. Little information is known in Türkiye about *AE2* so it can be displayed in the Gallipoli Historical Museum and an outreach programme can be started in educational institutions.

### Keywords

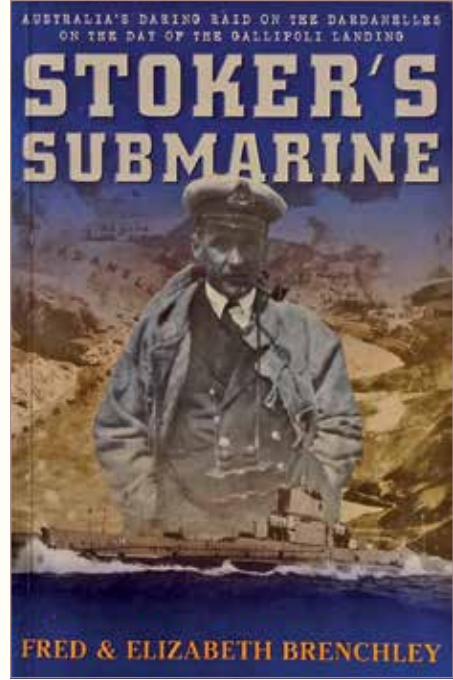
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*AE2*, Ghost Fishing, Sea of Marmara, Cultural Heritage Protection

## INTRODUCTION

**A** *E2* was one of the British-made submarines. It was the first submarine that penetrated the Sea of Marmara during the Dardanelles Campaign in 1915. This submarine belonged to Australian Navy, with Captain Henry Stoker. British submarines were successful in sinking some 50,000 tons of shipping, including small crafts, restricting the transportation of troops and supplies to the front in Gallipoli (Kolay 2022). As an enemy submarine, *AE2* was detected by the *Sultanhisar* gunboat and sank to 72 m depth, in Karaburun near Karabiga, on 30 April 1915 (Kolay et al. 2013). Later, through meticulous and intensive diving operations, the submarine was discovered by Mr Selçuk Kolay in 1998 (Smith and Özdaş 2015).

That was a significant challenge for experts of cultural heritage, marine scientists and even naval engineers because it was the first submarine wreck found belonging to World War I and there were bad memories related to the war. According to Dülger (1947), the submarine engine was targeted, later it was sunk and the crew was arrested by the *Sultanhisar* gunboat. This information was based on the interview with Major Ali Rıza who was the Captain of *Sultanhisar* (Figure 1). However, Captain Stoker's explanation was different (Brenchley and Brenchley 2003).



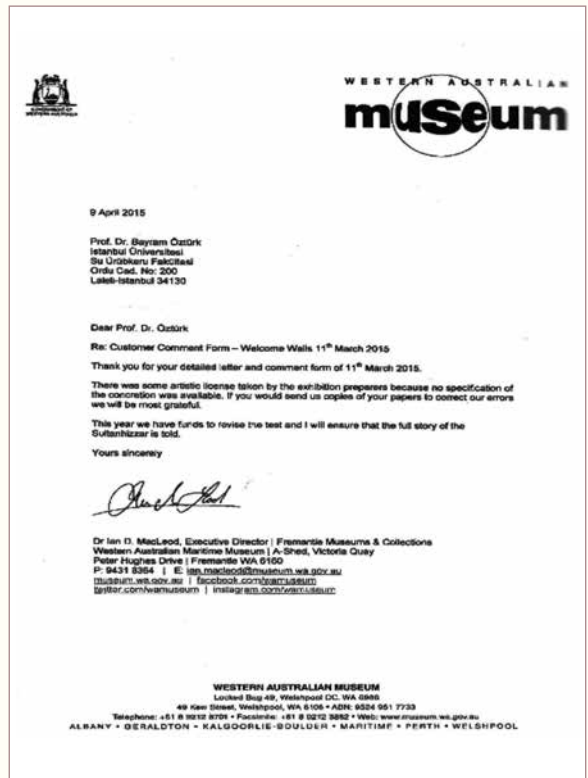
**Figure 1.** Covers of Ali Rıza's book entitled "How I sank the AE2 submarine in the Marmara Sea" and Brenchleys' "Stoker's Submarine" book.



**Figure 2.** A replica of AE2 at Western Australian Maritime Museum (© Öztürk 2015).

After long years of silence, a crucial discussion started about how to protect the *AE2* wreck, whether to leave it where it sank, or to transfer it to the Gallipoli Museum, or even to transport it to Australia. These issues were discussed by several experts in Istanbul during a meeting in 2004, organized by TINA (2004) and later in 2010 during the Sea of Marmara Symposium.

Meanwhile, Australian side made a replica of *AE2* and displayed it in the Western Australian Maritime Museum (Figure 2). However, there was some wrong information in the explanation for *AE2* and the author sent a letter after visiting the museum while returning from Antarctica in 2015. In response to that letter, Directorate of the museum sent the author a letter shown in Figure 3.




**Figure 3.** A letter from the executive director of Western Australian Museum about AE2.

## INTERNAL DISCUSSION ABOUT AE2 IN TÜRKİYE


In 2004, discussion focused on mainly three issues. First one was whether wreck can be displayed any part of the Çanakkale Strait (Dardanelles), mainly in Gallipoli War Museum or nearby. Motivation of this proposal was that the exhibition of the wreck could be attractive for local people and tourists. Besides, visitors can learn about history of World War I, including ANZAC campaigns. But for that purpose financial support was needed.

Second proposal was leaving the wreck underwater because protection measure of the submarine was more simple and no financial support was requested. In addition, there was another opinion that submarine should be transferred to Australia after floating operation. But this opinion was almost rejected after all discussion for political and legal complexity of the subjects.

After long silent years, in 2021, a Turkish deputy named Emine Gülizar Emecan, a former member of the National Assembly of Türkiye, has been concerned about this



**T.B.M.M.**  
CUMHURİYET HALK PARTİSİ  
Grup Başkanı:  
Tarih: 17 Eylül 2021  
Sayı: 35849




**Emine Gülizar EMECAN**  
İstanbul Milletvekili  
Plan ve Bütçe Komisyonu Üyesi

51360

**TÜRKİYE BÜYÜK MİLLET MECLİSİ BAŞKANLIĞINA**

Aşağıdaki sorularımın Kültür ve Turizm Bakanı Sayın Mehmet Nuri Ersoy tarafından yazılı olarak cevaplandırılmasını saygılarımla arz ederim.



**Emine Gülizar EMECAN**  
İstanbul Milletvekili

Çanakkale Valiliği, Türk Silahlı Kuvvetleri (TSK) ve Güney Marmara Kalkınma Ajansı (GMKA) ile ortak olarak **Çanakkale Savaşları** sırasında yaşanan mücadele sırasında **batan gemilerin dalış turizmine açılması** için bir çalışma başlatılmıştır. Avustralya Donanmasına ait olan AE2 denizaltısı da 1. Dünya Savaşı sırasında Marmara denizine girmiş, Sultanhisar botu tarafından batırılmıştır. Batık halen Marmara Denizinde Karabiga açıklarında 78 metre derinliktedir.

Bu çerçevede;

- 1-) AE2 Denizaltısının şu andaki durumu nedir?
- 2-) Ülke turizmine katkı sunmak amacıyla batığın çıkarılarak Çanakkale veya Gelibolu'da sergilenmesi için yapılan herhangi bir çalışma var mıdır?

Figure 4. A letter by Ms Emine Gülizar Emecan to the Ministry of Culture and Tourism about AE2.

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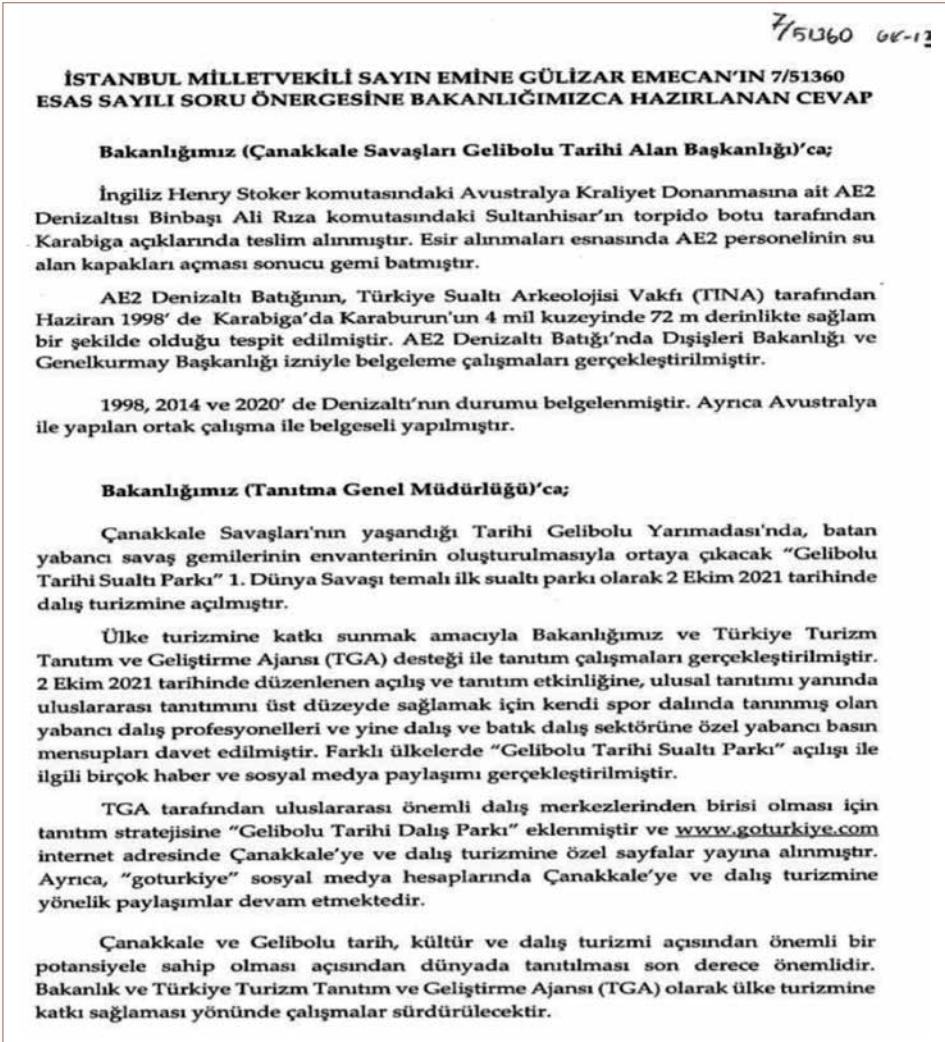


Figure 5. A letter by Ministry of Culture and Tourism replying to Ms Emine Gülizar Emecan's questions about AE2.

extraordinary wreck and raised a parliamentary question about it to the Ministry of Culture and Tourism at the Grand National Assembly of Türkiye on 17 September 2021 with a reference number of 35849-51360 (Figure 4). She also asked two major questions about the present situation of the wreck and the intention for displaying at Çanakkale or Gallipoli.

Later, the Ministry of Culture and Tourism replied to this inquiry and informed that some studies already started on the wreck (Figure 5).

In the reply to the question, the ministry shortly mentioned all jobs had been done so far for the wreck.

After this communication, the *AE2* wreck gained special importance even in Turkish parliamentary history because there is no other example of such a wreck becoming a topic of discussion in the parliament. For the moment, this initiative has resulted in a very positive impact for the preservation of *AE2* by getting attention of the public even though some land-based pollution and fishing activities impacted the wreck.

## FISHING IMPACTS

The *AE2* wreck is located near Karabiga, which is known traditionally as a fishing ground, mainly for shrimp beam trawling (Figures 6-7).



**Figure 6.** Shrimp trawling (black line) is allowed in the Sea of Marmara below 50 meters (Official Gazette 2006). The area off Zone 7 is close to the *AE2* wreck (green dot).

In 2006, Turkish Marine Research Foundation (TUDAV) applied to the Ministry of Agriculture and Forestry to close off the area around *AE2* against shrimp and purse seine fishing activities. The request was accepted in 2006, and fisheries operations in the wreck zone were banned with the Fisheries Circular No. 37/1 (Official Gazette 2006; TUDAV 2023).

The decision is on all kinds of fisheries activities. Nevertheless, ghost fishing is still a threat and needs to be monitored by relevant experts. In case of ghost fishing, it should be reported to TUDAV's ghost fishing database by fishers.

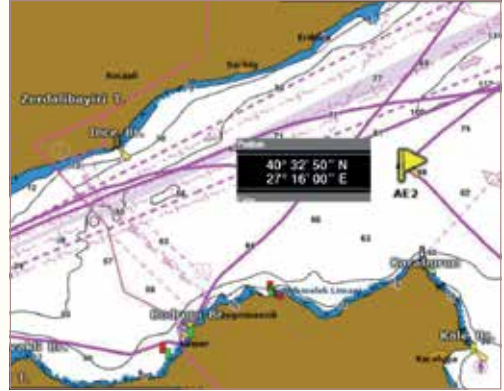
In fact, a marker buoy has already been deployed to the area, but still management of the fisheries is an important issue for local fisheries cooperatives and coast guards (Figure 8).

In 2021, a massive outbreak of sea snots in the Sea of Marmara was reported and suspended sea snots also sank to the bottom and on the wreck. This pollution did not damage or cover the submarine, but any kind of pollution can be a threat for the submarine wrecks.

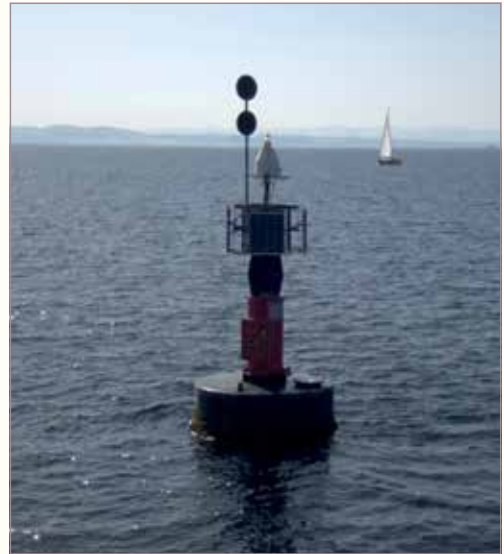
Protection of marine biodiversity in the entire Sea of Marmara is a crucial matter. There was a massive mucilage (sea snots) phenomenon in the Sea of Marmara and adjacent area in 2021 mainly due to eutrophication. This initiated the designation of Specially Protected Area status for the entire Sea of Marmara in 2021. This sea has an interesting peculiarity because of two-layered flow regime. Ecosystem of the Sea of Marmara and Turkish Straits System depends on water exchange between the Black Sea and Aegean Sea. Species list of the sessile and sedentary species is already defined. An outreach campaign is needed mainly for the fishers and sailors in order to prevent ghost fishing, pollution, and ensure safety of the marine transportation.

As a conclusion, making a biodiversity and habitat mapping of the wreck zone is also important to better understand ecological change and species diversity in the area as these can affect the condition of the wreck. Pollution sources should also be monitored for the area. Besides, invasive alien species, illegal and unreported fishing, and climate change should be included in the agenda for future regular monitoring. In terms of marine biodiversity, some communities octocoral, such as *Alcyonium palmatum* and *A. acaule*, have been observed (Figures 9-12). In Figure 9, however, a fishing rope is shown on the wreck, which implies ghost fishing with an abandoned fishing gear.

*AE2* is part of the war history and cultural heritage shared between Türkiye and Australia without discussion, thus it must be protected with stringent measures. Underwater cultural heritage has both historical and archaeological value for both nations. Needless to say, this



**Figure 7.** The exact location of AE2.



**Figure 8.** Marker Buoy of AE2, 2024.



**Figure 9.** Octocorals attaching to AE2 with a fishing rope hanging alongside. This photo was taken during the 2023 survey.

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**Figure 10.** An octocoral population on AE2 and Ghost fishing nets in 2024 (© Ç. Kedioğlu).

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**Figures 11-12.** Ghost fishing net, 2025 (© Rıza Birkan).

submarine wreck was found in Turkish waters and the responsibility to protect also lies on the relevant authorities in the Turkish government. In my opinion, displaying *AE2* in Gallipoli can be a priority for the Turkish Government because this precious wreck deserves attention by not only Turkish people but also people all around the world. To support this initiative, it is important to develop a fundraising campaign in Türkiye and Australia.

## ACKNOWLEDGEMENTS

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## **AE2: SEARCHING FOR THE FUTURE CONFERENCE, 17 MAY 2004**

**TINA THE TURKISH FOUNDATION FOR  
UNDERWATER ARCHAEOLOGY**

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### **ABSTRACT**

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The *AE2* submarine, which famously passed through the Dardanelles and entered the Sea of Marmara in April 1915, holds immense historical and cultural significance for both Türkiye and Australia. Following its discovery in 1998, efforts to plan and secure the future of the *AE2* wreck have involved collaboration among historians, archaeologists, divers, government representatives, and heritage professionals. The “*AE2*: Searching for the Future” conference, organized by TINA Foundation on 17 May 2004, brought together experts and stakeholders to discuss the preservation, research, and management of the submarine wreck, highlighting both its technical requirements and broader historical importance. The meeting’s outcomes emphasized continued bilateral cooperation and set the foundation for short- and long-term actions aimed at safeguarding the *AE2* for future generations.

### **Keywords**

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*AE2* Submarine, TINA Foundation, Underwater Archaeology, Türkiye-Australia Relations

On 25 April 1915, the Australian submarine *AE2* passed through the Dardanelles and entered the Sea of Marmara. It patrolled the Sea of Marmara for five days and was sunk by the ship *Sultanbisar* on 30 April. The entire crew was rescued and held as prisoners of war until the end of the war in 1918. A team led by Selçuk Kolay located the wreck of the *AE2* in June 1998, following a three-year search. In October 1998, an Australian group led by Dr Mark Spencer joined Kolay's team to verify the ship's identity.

Dr Michael White QC is the author of one of the history books on the *AE2*. The *AE2* holds great historical and emotional significance for both Turks and Australians. The *AE2* was the first enemy submarine to pass through the Dardanelles and reach the Sea of Marmara, and, according to some historians, this led the Allies to decide to continue the war rather than withdraw from Gallipoli, leading to a protracted land campaign during which casualties on both sides reached half a million.

Since the discovery of the *AE2* wreck, plans for the wreck's future have been taking shape rather slowly. Support and contributions are required from experts such as historians, archaeologists, divers, salvage companies and museum professionals, as well as from the governments of both countries. For this reason, the idea of holding a meeting to plan and discuss the future of the *AE2* was conceived, and following a de-



Panoramic Glass Hall at the Ritz Carlton Istanbul, where the meeting was held.



Savaş Karakaş's opening remarks. Selçuk Kolay in the middle and Dr Michael White QC on the right.

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cision by our Board of Directors, a meeting was organised under the auspices of our Foundation, led by Board Member Selçuk Kolay and Dr Michael White QC.

The purpose of the meeting, held on Monday 17 May, was to exchange views on the future of the *AE2*. Thanks to the generous support of Mr Mustafa Süzer, the meeting was held at the Ritz Carlton Hotel, to which our Foundation members, experts in the field, and relevant individuals and organisations were invited.

The meeting, attended by a large number of people, was chaired by our Board Member, researcher and documentary filmmaker Savaş Karakaş. Following Savaş Karakaş's opening remarks, the former Minister of Culture, Mr İstemihan Talay, who had shown particular interest in both our Foundation and this matter during his tenure, took the floor to describe the development and significance of the issue during his time in office. Mr Fikret Nesip Üçcan, Senior Adviser to the Prime Minister, who honoured us by accepting our invitation and who has always offered his support, also spoke at the event. In his address, he highlighted the significance of the *AE2* submarine—which is being monitored by the relevant ministries of the Australian and Turkish governments—for us, and stated that they would continue to follow developments. Later in the meeting, Dr Michael White QC took the floor to provide basic historical information regarding the *AE2*. Before lunch, the final speaker, Selçuk Kolay, delivered a visually supported presentation on the discovery of the *AE2* and the interpretation of the site and wreck.



Former Turkish Minister of Culture, İstemihan Talay.



Australian Ambassador Jonathan Philip, while speaking.

The lunch, held in the Ritz Carlton's unique restaurant with views of Istanbul and the Bosphorus, provided an opportunity for all participants to get to know one another and exchange ideas. In the afternoon session, Australian Ambassador Jonathan Philip spoke, explaining the significance of the *AE2* for Australia and conveying the Australian Government's perspective to the participants. In his speech, Mr Jonathan Philip noted that within the lands and waters of the Republic of Türkiye—a nation founded upon a magnificent history spanning thousands of years and surrounded on three sides by seas—there exist countless artefacts of immeasurable value dating back to nearly every period of history. He added that the significance of the *AE2* to Australians could only be fully understood when considering Australia's own 200-year history. Following Garry Kennedy's speech, Jonathan Philip and Garry Kennedy answered questions from the participants.

Tim Smith, who spoke later in the meeting, described the current physical condition of the wreck and the requirements for wreck surveying. Following a talk by Bill Sellars, an Australian journalist living in Çanakkale, on the preparations for the *AE2* documentary, our Board Member Enes Edis delivered a visually rich presentation outlining the requirements for the successful salvage of the wreck.

In the subsequent part of the programme, participants directed their questions to the relevant individuals and shared their own views. In the final section, Dr Michael White QC presented his recommendations regarding the short-term actions re-

quired for the project—which is planned to be completed by 2015, the 100th anniversary of the *AE2*'s sinking—to the participants for their consideration.

Following the meeting, it was decided that the recommendations made by Dr Michael White QC, taking into account the comments received, would be put into writing as soon as possible and submitted for the views of the relevant individuals and organisations.

The meeting, which was generally very successful, also attracted media attention. A half-page article in the Sunday supplement of the Sabah newspaper the day before the meeting, as well as reports in the Hürriyet and Akşam newspapers and on TRT, CNN Türk and Show TV following the meeting, generated public interest. Furthermore, Foundation representatives invited to the SKY Türk news channel in the coming days will provide information on the *AE2* and the meeting during a live broadcast.

The meeting, which also featured simultaneous interpretation, was deemed highly productive and successful not only by Selçuk Kolay and Dr Michael White QC, who identified the necessity of the meeting and conceived the idea, but also by the participants and our members in attendance.

We would like to thank everyone who contributed to the organisation of the meeting, but in particular the former Minister of Culture, Mr İstemihan Talay, who has been a steadfast supporter and advocate of this cause from the very beginning; the



TINA Board Member Ayhan Sicimoğlu, Ambassador Jonathan Philip, and TINA Chairman Oğuz Aydemir are sitting in the front row (from left to right).



From left to right: Tim Smith, Ambassador Jonathan Philip, Dr Michael White QC, Ayhan Sicimoğlu, Fikret Nesip Üçcan, Alpay Pasinli, Savaş Karakaş, and Selçuk Kolay.

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Prime Minister's Chief Adviser, Mr Fikret Nesip Üçcan, for the generous interest and support he has consistently shown; and Mr Alpay Pasinli, whose contributions during his tenure played a significant role in advancing the *AE2* initiative; the Australian Ambassador, Mr Jonathan Philip; and to Tim Smith and Garry Kennedy, who travelled from Australia for this meeting, as well as our expert speakers; and to all participants who showed interest in our invitation and are concerned with this matter.

We would also like to extend our thanks to Mr Mustafa Süzer, who made it possible for us to hold this meeting in an excellent setting by providing us with the stunningly panoramic Glass Hall at the Ritz Carlton Istanbul whilst an inspection was being carried out on the stern of the *AE2* submarine.



Australian team members and Turkish Navy officials during the opening reception of the AE2 workshop organised by the TINA Foundation (2007–2008).







DESTINY OF

# AE2

AN AUSTRALIAN SUBMARINE  
IN THE SEA OF MARMARA, TÜRKİYE

EDITORS: BAYRAM ÖZTÜRK & KEREM ÜNAL

In a speech delivered in 1934 during the ceremonies marking the anniversary of the 18 March Naval Victory at Gallipoli, Mustafa Kemal Atatürk, the founder of the Republic of Türkiye and its first President, addressed the mothers of the Anzac soldiers:

*“Those heroes that shed their blood and lost their lives...  
You are now lying in the soil of a friendly country.  
Therefore, rest in peace.*

*There is no difference between the Johnnies and the Mehments to us where they lie side by side here in this country of ours...*

*You, the mothers who sent their sons from far away countries, wipe away your tears; your sons are now lying in our bosom and are in peace.*

*After having lost their lives on this land,  
they have become our sons as well.”*

Mustafa Kemal ATATÜRK, 1934



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