

Up periscope: submarine *AE2* makes first contact

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Figure 1. Dr Mark Spencer (left) congratulating Mr Selçuk Kolya on his discovery of the *AE2* wreck, above the site. Photo: Hasan Gull.



Figure 2. The Project *AE2* (1998) team with their Turkish hosts. Photo: Mark Spencer.

On 2 July 1998, Mr Selçuk Kolya entered the Sea of Marmara in Turkey for a dive to 73 m (240 ft). Here he landed beside the wreck of the Australian submarine *AE2*, lost in combat on 30 April 1915, 83 years previously. It was a successful end to a four-year dedicated search by Mr Kolya, Director of the Rahmi M. Koç Museum in Istanbul. It marked the beginning of discussions regarding *AE2*'s new fate. This paper details the subsequent joint Turkish–Australian investigation of the Australian World War One submarine wrecked near Gallipoli.

Historically significant to both the Turkish and Australian nations, the search for this intriguing wreck site only began systematically in 1995. At that time Selçuk Kolya began surveying parts of the Sea of Marmara, east of the famous Gallipoli Peninsula.

In 1997, an Australian team was formed by Dr Mark Spencer to assist in the inspection of an earlier wreck located by Kolya and thought to be *AE2*. Located in 86 m of water (282 ft), the site was unfortunately found to be a coastal iron (or steel) screw steamer dating to the late 19th–early 20th century. Buoyed by the subsequent discovery, the Australian team travelled to Turkey again in 1998 to assist their Turkish hosts in the identification and preliminary assessment of the new find.

The Project *AE2* expedition received principle support from the Department of Defence—Navy (RAN) as major sponsor. The Australian Institute for Maritime Archaeology (AIMA) also endorsed the project's aims and objectives.

The Australian team comprised Dr Mark Spencer (Director and underwater photographer), John Riley (site identification), Richard Taylor (dive supervisor), Merv Maher (video) and the author.

What is the *AE2* and why is it of significance?

One of the fundamental aspects of *AE2* is its rarity. It is one of the few British E-Class submarines located internationally and is one of the most intact.

Only 57 boats of this class were ever built. They were, at the outset of World War One, amongst the most advanced class of submarine afloat. Today we have a limited understanding of their operational characteristics, fitting out and life on board, as it derives from surviving building plans and personal diaries. As an archaeological site therefore, the *AE2* submarine, through careful archaeological study, could contribute significantly to our understanding of this class of vessel.

In the historical record, the *AE2* is important in the study of the formalisation of the Royal Australian Navy, and as an icon of Australian deeds in battle. The submarine, along with its sister *AE1*, were purchased at a time of transition to a wholly Australian fleet. At that time, there was heated debate regarding the most appropriate way to achieve modernisation. Submarines entered this debate under some conflict.

The *AE2* was also the first submarine, together with *AE1*, to visit Australia in 1914 after the longest submarine voyage in history. Darwin, therefore, was the 'first contact' of this class of vessel with Australia.

But of lasting acclaim, the *AE2* carried the first Australian fighting men into the bloody Gallipoli Campaign of 25 April 1915. In this regard, it was also the first Allied submarine to successfully penetrate the extensive Turkish blockade of the Dardanelles Strait and reach the inland Sea of Marmara, leading to Constantinople (modern Istanbul). Prior to this, two submarines had been utterly destroyed in the attempt.



Figure 3. Launch of AE2 at Barrow-in-Furness on 18 June, 1913. Photo: courtesy Royal Australian Navy Historical Collection and Main Repository, Spectacle Island, Sydney.

News that an Australian submarine had broken through the Turkish defences and was causing havoc in the Sea of Marmara was a welcome tonic to the beleaguered land forces. Notes were quickly dispatched amongst the 'diggers' clinging to the cliffs and gave them added determination to hang on.

The initial success of *AE2* may have had some bearing on the British High Command's decision to cancel the planned evacuation of Allied troops from the Gallipoli beaches on the day following the landings. They could not have known that the *AE2* would survive for only four more days!

Much of the story of *AE2* has survived today through the memoirs of Commander Henry Stoker, captain of *AE2*. His work, *Straws in the Wind*, was written after the war and provides a light-hearted account of the vessel from its deployment in 1914, to the crew's internment as Prisoners-of-War (Stoker, 1925). The story ranks as one of the important records of wartime life in a submarine during World War One. While not as well recognised as later submarine sagas, *Straws in the Wind* records First World War technology and daring, and documents one of the most significant land and sea campaigns of recent times.

Project *AE2*

Project *AE2* was conceived by underwater photographer, Dr Mark Spencer, who had keenly followed the continued searches made by Mr Selçuk Kolay. The project's principle aims were: to confirm the identity of the wreck site on behalf of the Royal Australian Navy; to photographically record the site; to build a wreck site condition model; and, to complete an archaeological report and management plan to assist in the long-term management of the site.

The Turkish Ministry of Culture granted archaeological research permits to allow the investigation to proceed.

Where was *AE2* and what caused it to sink?

Captain Stoker recorded that the *AE2* sank four nautical

miles north of Kara Burna Point (modern Karaburun) in the Sea of Marmara. Stoker estimated the water depth at 330 ft (100 m). The wreck site was in fact located four miles north-north-west of the point in a water depth of 73 m (240 ft).

During a fateful action of 30 April 1915, *AE2*, under heavy attack from surface vessels, lost all diving control and frequently crash dived then bobbed to the surface. During one of these episodes, the engine room was shelled by the torpedo boat *Sultanhisar*, leading the crew to scuttle the vessel.

Some presumed that the loss of buoyancy occurred as *AE2* dived through a level of greater density (Chatterton, 1935: 228). On face value this seems the most realistic cause. Sudden losses of buoyancy had affected the control of submarine *B.11* while trying to run in the mixture of fresh and salt water at the entrance to the Dardanelles. *E.15*, before its loss, had risen from a layer of salty water and lost control when it passed into fresher water above (Jameson, 1962: 35). Project *AE2* divers were immediately conscious of distinct water layers on their dives. A halocline¹ was observed as they passed from a dirty surface layer into an almost crystal clear layer beneath. The divers noted that this layer was clearly visible at a depth of approximately 18 m (60 ft).

It is noted that a heavy undercurrent flow of saline water from the Mediterranean flows into the Dardanelles from the Aegean, through the Sea of Marmara, then through the Bosphorus into the Black Sea in the north. This flow prevents the Black Sea from becoming a fresh water body. The fresher surface water discharging south would explain why *AE2* suddenly developed so much positive buoyancy as it hit this lower layer, bouncing quickly back up to the surface.

AE2—construction details

The new E-class were a development of the earlier British D-class submarines, being larger, better armed and with a greater range. They were equipped with twin screws, each driven by an eight-cylinder diesel engine of 800 BHP and had a safe diving depth of one hundred feet, but were in fact sufficiently strong enough to descend further. Becoming the workhorses of the British First World War submarine fleet, they achieved an impressive war record (Akermann, 1989: 151).

Built by Vickers, at Barrow-in-Furness, the *AE2* was launched on 18 June 1913. It was commissioned as a unit of the new Australian Navy on 28 February 1914 and then, with *AE1*, made the historic crossing to Australia. With a surface displacement of 652 tons and calculated hull of 784 tons, the submarine had a length of 176 ft (53.65 m) and was armed with 4 x 18-in torpedo tubes. The E-class boats had a range of 3 225 nautical miles and a crew of 31 including 3 officers and 28 ratings (Akermann, 1989; White, 1992: 9–14).

The search for *AE2*



Figure 4. *AE1* and *AE2* (behind) in dry dock at Cockatoo Island after their world record voyage from England to Australia. Photo: courtesy Naval Photographic Section, Garden Island Naval Dockyard, Sydney.

The majority of shipwrecks from the Dardanelles Campaign were discovered during the 1960s and 1970s. They were located either by dedicated salvage teams, Turkish Navy divers or private individuals. Notable wrecks include the French submarines *Saphir*, *Joule* and *Mariotte*, the dreadnought *Bouvet*, the Turkish *Messoudieh* and the British battle losses, *Ocean*, *Triumph*, *Majestic*, *Goliath* and *Irresistible*. The wrecks of the severely destroyed British submarines *E.7* and *E.14* have been found although much reduced.²

Initial dives on the shipwreck

As noted, Mr Kolay conducted the first dives to the newly located wreck on 2 July 1998. Visibility was average with a maximum of 2.5 m. The Australian dive team began their diving operations on 2 October. Due to the extreme depth and using mixed gas apparatus, they were limited to a bottom time of approximately 10–12 minutes. The total dive time was 92 minutes allowing for a carefully managed ascent.

Wreck site identification

Although no identifying insignia were observed on the hull,³ the vessel's construction and overall layout could be readily compared to surviving historic plans for *AE2*. The wreck's location also closely corresponds to historic accounts of the loss. As the only early Group-1 E-class



Figure 5. Perhaps the last photograph taken of *AE2* on 13 April 1915, just twelve days before its entry into the Sea of Marmara on 25 April. Photo: courtesy Peter Smith Collection.

submarine wrecked within the Sea of Marmara, the identification is secure.

Major identifying features included the tapering fin (or conning tower) with its single hatch hinged on the port side (left slightly ajar). Also atop the tower are found the twin periscope bases with a steel hawser between. Forward of the tower is the well defined casing devoid of a deck gun (commonly fitted to later E-class variants), the forward radio aerial mast and the distinctive sloping casing section covering the bow anchor winch. Other features include the 'lipped' bow, the cap over the single forward torpedo tube, the port side anchor and forward hydroplanes. Visible aft of the fin is the aft torpedo derrick hatch (cover missing), the twin hydroplanes and guards, the single stern torpedo tube, rudder (turned to starboard), and the tips of the port and starboard three-bladed propellers.

Comparative submarine wreck sites

The British, *E.20* is the only other E-class submarine lost in the Sea of Marmara and has not yet been discovered. A later variant with the addition of a 6-in howitzer mounted forward of the conning tower, it is significantly different in construction from *AE2* to be readily identified. Historic references place the wreck event north west of Marmara Island and in an area where water depths reach 700–800 m (2 300–2 625 ft). The six other known Dardanelles Campaign submarine losses occurred within the restricted Straits area. They include the fragmentary remains of *E.7* and *E.14*.

Two E-class wrecks have been detected in the United Kingdom, they are *E.39* near Wales and *E.49* in the Shetland Isles. *E.3*, *E.17* and *E.24* have reputedly been located in waters adjacent to the Dutch coast although they have suffered from uncontrolled souveniring.⁴ There has been no detailed assessment of any located E-class wreck site and most appear to have been severely stripped by divers. The *AE2* therefore provides a unique opportunity to study an early E-class submarine in its



Figure 6. Dr Mark Spencer, Project *AE2* Director, about to enter the water with camera equipment. Mr John Thomson, grandson of *AE2*'s wireless operator, Albert Thomson, assists. Photo: Tim Smith.

contextual setting.

Threats affecting the located wreck site

The following threats are identified which might impact on the integrity and long term survival of the *AE2* wreck site.

Human threats

1. DAMAGE BY FISHING NETS

While the *AE2* wreck site is intact, it has been damaged by uncontrolled fishing activity. Visible damage includes fouling of the hull from net hook-ups, stripping of the protective marine formations and resulting active corrosion (particularly visible at the bow and conning tower). In places, this impact has caused hull plates and rivets to be sprung, while net trawling gear has caused noticeable denting along the hull sides. Extensive fishing activities continue to occur throughout the Sea of Marmara. The inadvertent damage caused to historic shipwrecks was noted during the 1997 field inspection. Here, an iron paddle steamer wreck located near the port of Sarkoy was heavily snagged. It took the combined effort of two tugs to remove the fouled nets. Resulting

damage to historic shipwrecks is well known. It can lead to the serious destabilisation of a site, the destruction of protective marine growth coverings, and the distribution of a site across a large area of sea floor.

2. ANCHORING OF MERCHANT AND OTHER VESSELS

The *AE2* is at minimal risk of anchor damage being located outside of the anchoring zones near the major shipping channel through the Dardanelles Strait. The volume of shipping traffic is considerable with a total of nearly 20 000 foreign registered vessels passing through the Sea of Marmara in 1994 alone.⁵

3. DIVER ACCESS

Once located, shipwrecks can become the focus of intense visitation by recreational and other divers. The continued development of diving apparatus means that sites once deemed safe from inquiry due to water depth are rapidly coming within range. This visitation, if uncontrolled, can result in the removal of individual components of a wreck's structure and the deterioration of its integrity. Further, interference with the relatively stable environment in which a wreck lies, e.g. protective marine growth, can lead to accelerated corrosion rates.

4. DEVELOPMENT

Offshore developments such as seafloor dredging, the construction and laying of pipelines and undersea cables could conceivably impact on the site, although this is considered unlikely in the short term.

Environmental threats

The site left undisturbed from human interference can be expected to undergo a natural process of physical deterioration. This includes deterioration of the vessel's fabric together with associated artefactual material. The rate of this deterioration is subject to a range of factors and is a dynamic process. Increasingly well documented, the process varies from site to site with the degree of deterioration being dependent on, but not exclusive to: the period of immersion, the physical condition at time of loss, the exposed surface area, the quality of materials used in construction, the vessel's engineered structural strength, the nature of the bottom topography, dissolved oxygen levels, water temperature, pH, marine colonisation, prevailing water and current movements and scouring regimes, etc. The assessment of a site's physical deterioration processes requires a specialised conservation study and a regular monitoring program.

A question of salvage

The discovery of the Australian submarine *AE2* has immediately sparked widespread media interest (e.g. Brenchley, 1998). The possibility of salvage was canvassed early (Thomson, 1996), an *AE2* Recovery Committee being formed in Australia. Further support for the Committee's desire to see *AE2* raised (or relics from) and returned

for display in Australia was outlined in a letter from the Submarines Association of Australia to the Hon. Mrs Bronwyn Bishop, then Minister for Defence, Industry, Science and Personnel, in August 1997. This came with the support of the Navy League, the Naval Association of Australia and others. Mr Selçuk Kolyay has since indicated that he intends to explore options to salvage and raise the submarine for permanent display, potentially at the Rami M. Koç Museum in Istanbul, of which he is Director.

Australia and Turkey are signatories to the UNESCO Convention for the Protection of the World Cultural and Natural Heritage, known as the *World Heritage Convention* (1972) which recognises that the world's cultural heritage transcends national boundaries and must be preserved for future generations. Turkey is also a member of the Council of Europe, which delivered the *European Convention on the Protection of the Archaeological Heritage* (1979).

Several international charters also seek to promote appropriate care and management of archaeological sites that are of direct relevance to the implementation of management strategies for the AE2 wreck site. The ICOMOS International Committee on the Underwater Cultural Heritage established in 1991 is addressing international concern over the protection of the world's underwater cultural resources. The *Charter on the Protection and Management of Underwater Cultural Heritage* (1996) has a primary aim to promote international cooperation in the identification, protection and conservation of underwater cultural heritage sites (O'Keefe, 1993; Hosty, 1995). While still undergoing development, the ICOMOS General Assembly ratified the draft charter in 1997.

As all officers and crew successfully evacuated the vessel, the AE2 wreck does not constitute a War Grave.

A question of ownership

The Australian Government acted early to register its claim as retaining ownership of the wreck of AE2. This claim was made under international law concerning shipwrecks, with the aim to ensure that the structural integrity and historical significance of the AE2 is preserved.⁶ That the Australian Government can lay claim to ownership of its war losses in foreign territories is supported by discussions concerning the loss of other notable war wrecks, such as the Japanese submarine I-124 in the Northern Territory of Australia (McCarthy, 1991; 1998).

The issue is complicated, however, if a vessel is found to have been surrendered. Although unresolved, there is anecdotal information suggesting that Commander Stoker at least surrendered his crew to the Turkish forces.⁷ In the normal instance, according to McCarthy (1998)

...regardless of whose waters a ship lies in, unless the vessel was surrendered before it sank, it remains the property of the parent 'State' until rights to the remains are sold or given up by its government.

If surrendered, however, the wreck may then become

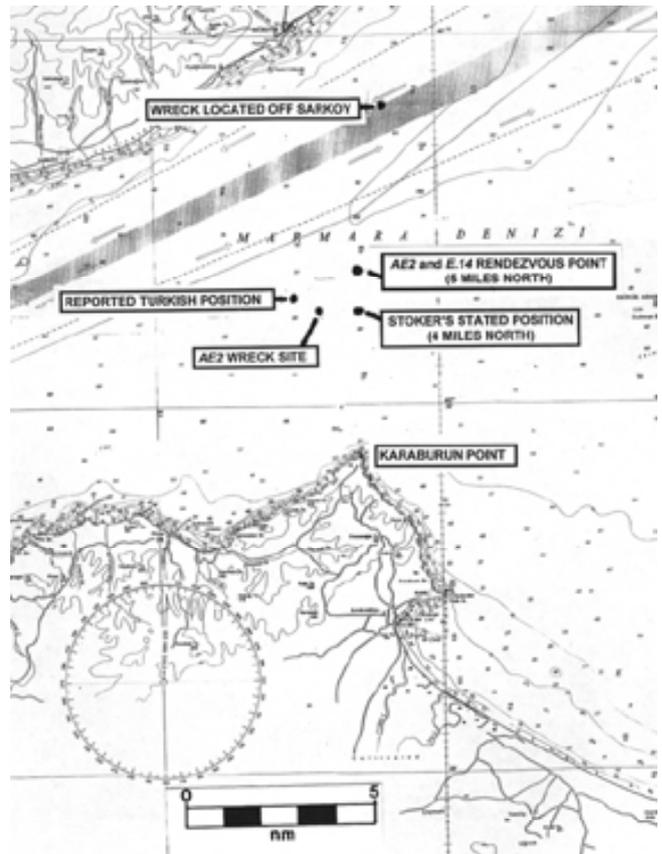


Figure 7. Approximate location of the AE2 wreck site.

the property of the Turkish Government who could feasibly pass on their rights to another party or persons. While it is difficult now to ascertain the details, by virtue of purposely scuttling the vessel, the crew arguably did not surrender the boat. This issue needs further clarification in order to determine which country has overriding jurisdiction in the management of the wreck site.

At the present time, the wreck site is not automatically protected by the Turkish cultural heritage legislation, 2863 sayılı Kültür ve Tabiat Varlıklarnı Koruma Kanunu (1983), as it is 'younger' than the pre-AD 1900 age qualification period. Sites deemed significant and dated after this period, however, can be designated Historic Sites by the Turkish Ministry of Culture. Any investigation or work at the site remains at the discretion of the Directorate-General of the Protection of Cultural and Natural Assets, within the Ministry of Culture. Historic sites located underwater are investigated, identified and registered under the direction of the Ministry of Culture. The gazettal of the AE2 would require the approval of State Parliament.

The AE2 archaeological site

A submarine wreck is the paramount sealed archaeological deposit and has been discussed in detail (McCarthy, 1998; Smith, 2000). Technically, every aspect of the site from its external fabric to internal fittings and record of human occupation lies as an integrated unit on the seafloor. As the proverbial 'time capsule' it is quite unique. This

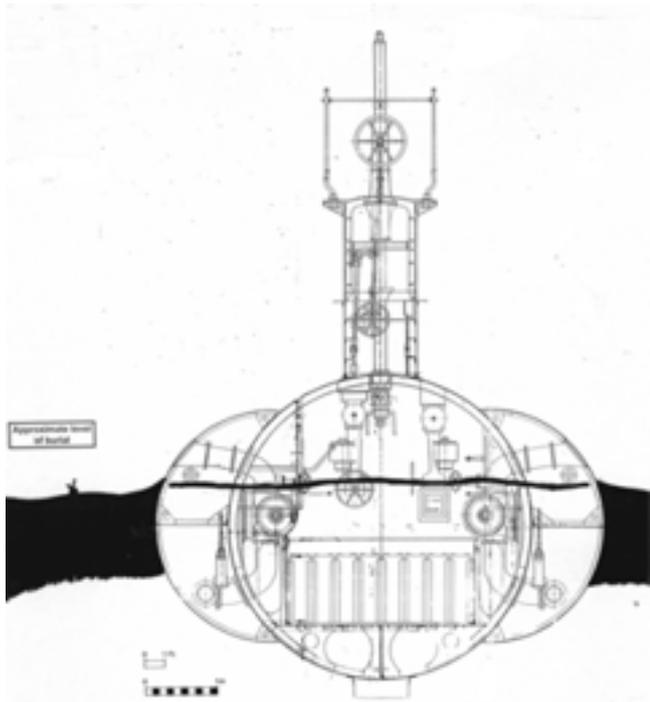


Figure 8. This illustration provides an estimate of the buried depth of the *AE2* hull amidships. This is based on observed silt levels at the bow and stern. It indicates, that while the raised ends of the boat are quite lightly bedded in the underlying strata, the central body of the wreck remains sunk to its approximate floating waterline. Approximately 3 m depth of the hull remains buried in the silt bottom amidships (keel to top surface).

is especially so as the site has survived in a stable water environment where environmental factors have acted to maintain the integrity of the whole. In reality, a level of natural deterioration of the site is to be expected from the corrosion of metals and other materials that constitute the site.

The rate and extent of this deterioration has an obvious effect on the retention of the site in its complete form. Project *AE2*'s role was restricted to establishing the vessel's identity and to undertaking a preliminary assessment of its archaeological potential and physical integrity. The proper assessment of the vessel's structural condition would require a specialised materials conservation program that was outside the terms of the team's archaeological permit. Some general comments can be made.

AE2 sank after minimal damage from Turkish fire, damage being confined to a number of small calibre shells piecing the pressure hull towards the stern. This damage was not visible at the wreck site but it is presumed that this part of the hull is buried. Only the conning tower hatch was left open as the vessel sank (apart from flooding valves), leaving this the only significant opening to the internal cavity of the vessel. The hull sits upright and apart from limited corrosion of outer plating, appears 'visually' structurally intact.

The floor of the Sea of Marmara is largely comprised of soft silty deposits, providing an anaerobic environment conducive to the retention of the buried hull remains. Characteristic of observed iron shipwreck disintegration patterns, the *AE2* has settled to a depth comparable to its approximate water-line level. The ballast keel has also acted to keep the hull in an upright position on the seafloor.

It can be presumed that the internal cavity of the hull is largely intact, based on the engineered structural strength of this portion of the vessel and its enclosed nature. The outer, generally thinner casing forming the side-saddle ballast tanks and conning tower is likely to have undergone comparatively more deterioration with loss of metal thickness. This can be evidenced in surface pitting of the metal and isolated disintegration of original plates between frames (particularly on the tower). It is impossible to record the condition of the buried portion of the hull, although it is expected that it would have retained significant physical form.

The most obvious damage to the hull has derived from the abrasion of fishing nets. Nets have fouled the bow, conning tower and stern, and have accelerated corrosion at these points. A plate on the starboard bow has been wrenched loose from the impact, while other bow plates have sprung. At several points along the hull, denting from collision with net trawling gear is evident. Continual hook-ups are likely to lead to further destabilisation of the external fabric.

Management options

With discovery and positive identification, a conservation and management strategy should now be completed for the site. This strategy should assess appropriate management options for the wreck and associated artefact collections, following consultation with appropriate Governments, organisations and specialists. Management options are dependent on a thorough understanding of the nature and complexity of the site. Constraints such as ownership, threats, research potential, conservation requirements, access and interpretation issues will define the management options applicable to the site.

A standard primary management requirement would be the implementation of a comprehensive pre-disturbance maritime archaeological survey of the remains. This survey is essential to establish base data on which to construct a viable plan of management. It is essential to determine the site's integrity, condition, physical spread, the local environmental conditions impacting on the site and importantly, perceived threats affecting its long term survival.

Based upon a thorough knowledge of the site, including the complete documentation of its external structure, assessment of hull condition and corrosion processes, a more objective strategy for preserving the site can be formulated. Several constraints may not have been evident prior to the discovery of the site, for example

diver visitation, surveillance and monitoring, and must also be quickly addressed. The depth of the site and reduced bottom times will constrain options for detailed diver-based examination of the hull.

One management option for the site is to leave it undisturbed. This approach identifies the underwater site as a cultural monument that should be allowed to deteriorate naturally in its contextual setting. The *AE2* survives as the largest Gallipoli war relic in existence. The effective application of this approach requires strict upholding of the provisions of legislation governing archaeological heritage, in consultation with international codes of conduct established to preserve and protect these sites. This might require the invocation of a permanent exclusion zone around the wreck site barring human visitation, fishing activities and vessel traffic; the establishment of effective site surveillance regimes; and a publicity campaign aimed at identifying the cultural significance of the site and the need for its long-term protection and survival.

A variation to this approach would be to allow controlled human visitation to the site. Visitation would require the establishment of strict access for the purposes of *bonafide* research, conservation and possibly recreation. Mitigating factors would include site depth, diver safety, access, adequate surveillance and effective legislative control to ensure the security of the site.

A favourable option would be the establishment of a joint, mutually rewarding involvement in the ongoing assessment and management of the site. Recent discussions regarding the establishment of the Gallipoli Peace Park on the peninsula is an example of the cooperation attainable between the respective governments.

Discovery of a wreck site does not automatically equate with salvage and display. A range of factors must be considered, foremost—what is in the best interests of the archaeological site. Many hundred submarine wrecks lie on the sea floor preserved as in situ archaeological sites, a large percentage still awaiting discovery. Recreational divers can visit several of these allowing them to gain a unique first-hand appreciation of their archaeological, historical and recreational potential.

A common archaeological approach aims to preserve these and other underwater cultural sites as ‘museums beneath the sea’ (see Goodheart, 1999 for recent comment on the debate). This has been effectively achieved through comprehensive non-disturbance archaeological documentation, historical research, colourful publications, photography and documentaries. Stunning general publications include Ballard’s discoveries of RMS *Titanic*, *Bismark* and *Lusitania*. There are many mediums available by which to document the site to a wider audience without the need for any disturbance. They include CD Rom technologies, submersible tours and real-time video links to the wreck for research, monitoring and public education. Paying trips to the *Titanic* are already a reality (Goodheart, 1999:

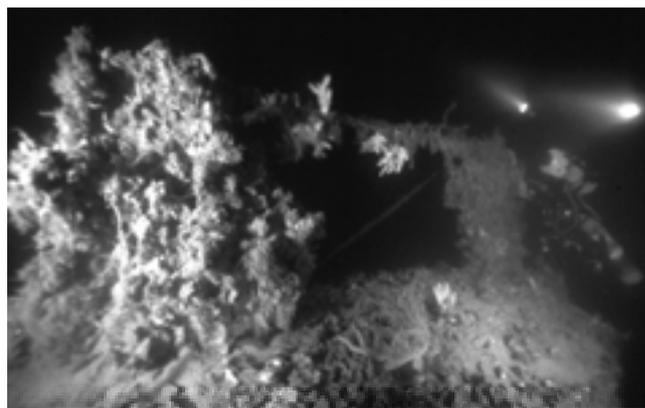


Figure 9. Visible in the foreground is the aft periscope base and close by, the crew hatch. The forward periscope (at right), connected by a steel hawser, is now encrusted with colourful sponges. The conger eel ‘Bunts’ exits the tower by the slightly open hatch. Photo: Mark Spencer.

45), while direct live-feed video monitoring of wreck sites was initiated as early as the 1980s by the *Hamilton/Scourge* Foundation’s inspection of the Great Lakes shipwrecks in Ontario, Canada. An option being explored for the display of the German U-boat, *U-869*, located in deep water off New Jersey, USA, in a ‘virtual museum’, where regular images of the wreck and its history can be displayed on the Internet. An *AE2* web page has already been established on the Royal Australian Navy’s official web site.

Uncontrolled access to the *AE2* site would pose a significant threat to its integrity. Souveniring of relics would have a detrimental effect on the site’s archaeological and interpretative potential. The disastrous results of uncontrolled salvage can be seen at the majority of previously located underwater Dardanelles war wreck sites and E-class submarine wreck sites located internationally. Most have been severely stripped of external fittings and personal items where the hulls have been breached. In some cases, up to 80% of Dardanelles’ wreck sites have been reduced by these means, with a total lack of recording or conservation treatment. The majority of these sites were salvaged in the 1960s for their metal alloy content, some sites such as the French submarine *Saphir*, reduced to the small collection of hull fragments on display in the grounds of the Naval Museum in Istanbul.

While an incredibly costly and technologically difficult operation, salvage of the site might be discussed as a management option, depending on perceived threats to its survival. A least desired management alternative, salvage options would need to address a range of factors—foremost amongst these being who would fund and manage such a long-term project. Also of concern is how the 800-ton hull could be effectively stabilised, and how the internal artefact collections could be properly recorded in context. It would seem that only complete recovery of the hull would allow for the proper archaeological recording to succeed. Poor or insufficient preparation and planning

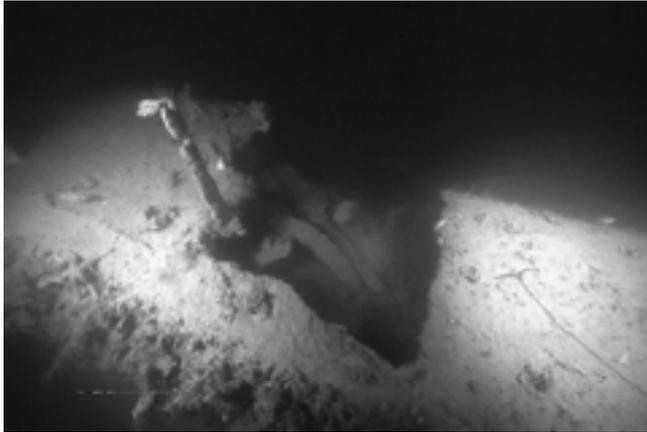


Figure 10. The distinctive slope in the forward casing which concealed the forward anchor winch. Note corrosion. Photo: Mark Spencer.

would obviously lead to disaster in archaeological terms and place the remains in jeopardy in the long term, particularly without appropriate conservation protocols in place. Recovery should only be considered where it can be supported on site survival, research and educational grounds.

At least 90 submarines are preserved around the world today as museum fleet vessels or on internal display. However, these have largely derived through the decommissioning of naval units or as prizes of war and therefore have not been immersed for substantial periods of time. Their conservation and ongoing maintenance is therefore far more achievable than the recovery of a complex, waterlogged archaeological structure. The fascination of the general public with these sites cannot be discounted, nor their importance to museums and other institutions as major revenue drawcards (Hosty, 1995). Recovery as a means of boosting museum attendance levels, however, is contrary to international museum acquisition policies.

Salvage should only be considered an option if raising and relocation will not compromise the integrity of the site. Of critical concern is the availability of sufficient resources and appropriately qualified personnel to undertake the careful recovery, conservation, registration, restoration, display, storage and long-term monitoring of the site and associated collections. Experience shows that the salvage of such large and complex archaeological items and their exhibition to internationally recognised archaeological and museum standards can be an extremely costly and prolonged journey. The conservation of the comparatively small 63-ft (19.20 m) British submarine *Holland 1* (1901–1913) is an example. Raised in 1981 from 63 m of water (Mealings, R., 2000, pers. comm), the process is still continuing today at The Royal Navy Submarine Museum, Submarine World, at Gosport, United Kingdom (Barker, 1997; McCarthy, 1998). These projects require immense outlays of capital, labour and time, and once started, cannot be terminated without potential disaster

for the archaeological item, an example being the German U-boat *U-534* (1942–1945, length 76 m) raised in 1993 from 68 m (223 ft) of water off Denmark (McCarthy, 1991). Conservative estimates for the retrieval of *AE2* range between \$AUS1.5–4 million, but for return to Australia, full conservation and permanent display, budgets of \$AUS80–100 million are not unrealistic. Parallel costs for restoration within Turkey are expected to be significant.

Ethically there should be sufficient research potential or other justification to warrant embarking on this process. This might be argued if retention of the item *in situ* could compromise its survival, e.g. due to the threat of a development proposal, the advanced deterioration of the structure of the site, or its survival as the only record of a specific type. Here, the item may be of rare or unique design where excavation, conservation and display would provide answers to specific research questions. An example is the 45-ft (13.70 m) long *Resurgam* (1879–1880), the first British powered submersible, located in 18 m (60 ft) of water off North Wales, United Kingdom, in 1996 (Gregory, 2000; Bowyer, 1999).

The site might be associated with a significant historical event providing a justification for raising and public interpretation. The small Confederate submersible *H.L. Hunley* (1863–1863) provides an example, being the first to sink a warship in history. This vessel measured 39 ft in length (12 m) and was recovered from a water depth of 9 m (30 ft) in 2000 (Murphy, 1998).

Salvage in these cases is not seen as an immediate action. The necessity for detailed archaeological site survey and assessment of the wreck's physical condition and conservation requirement, dictates the need for careful analysis. In the case of the *Resurgam* and *H.L. Hunley*, detailed monitoring of these complex (although proportionally tiny) underwater sites was, and remains, an ongoing process. Monitoring of the wrecks *in situ* can be calculated over several years while the conditions of salvage and post removal conservation are formulated. In many instances, the conservation treatment of the hull and associated elements can be initiated on the sea floor, greatly assisting later 'laboratory' treatments.

Arguably, in world terms, there has not yet been a successful large-scale recovery and conservation project involving an iron or steel wreck site. This poses the question, could *AE2* (length 176 ft, 53.65 m) be raised and successfully treated, housed and displayed for eternity? It is difficult to identify a country that has the conservation expertise, infrastructure and resources to embark on such a monumental and costly project.

There is no denying that the *AE2* shipwreck would make a fascinating public display with the potential of becoming a world class museum attraction. The vessel's early design, its involvement in the monumental Dardanelles Campaign of World War One, its dramatic exploits in breaching the Dardanelles Strait and its association with the ANZAC legend, are all significant aspects which could be presented

through a comprehensively themed display.

Salvage of the site purely as a future source of financial returns for a museum or salvage consortium however, is not an ethical justification for acquisition and display of archaeological material. As Hosty (1995) has indicated, museums, as the largest collectors of cultural heritage material, must be seen to be setting an example in this area.

Hosty discusses the position formulated in regard to museum collection policy by the International Council of Maritime Museums (ICMM). ICMM agreed that its members should follow the provisions of the Council's Code of Professional Ethics (1990), the ICOMOS *International Council on Monuments and Sites Charter for the Protection and Management of the Archaeological Heritage* (1990) and the UNESCO World Heritage Convention (1972), in terms of only accepting archaeological material which has been scientifically recovered, based on an established research design, a sound management and conservation strategy, and where the work was undertaken by professionals in maritime archaeology and conservation science.

If the salvage of *AE2* can be justified in terms of answering specific research questions and where its effective conservation and financial support has been identified and deemed possible, then this work must meet the highest international standards and follow accepted international practice. The *AE2* wreck site is more than an empty shell, it formed during its working life, a living environment for officers and crew. As such, the site is more than a source of information on construction practices, material and design technology at the outset of the Great War. It also retains personal effects and material remains with potential to document the personal side of life in a submarine during wartime. Information on victualling, stowage, living conditions, social stratification in terms of duties and functions, hardships and danger can be expected to be obtained. This requires a well thought out archaeological methodology prior to any anticipated excavation, recording and removal of internal remains.

The establishment of appropriate techniques for the scientific excavation, recording and transport of archaeological materials from within the sealed hull is deemed to be of paramount importance. Modern archaeological approaches to the retrieval of this class of cultural material pose significant technical difficulties when applied to a sealed submarine hull. Principle amongst these is the depth to which the site is located. One option might be to remove the site to a shallow water environment where greater controls can be exercised.

Access to the internal compartments of the wreck site is presumably limited in the case of *AE2* to the small conning tower hatch. However, the need for methodical *in situ* recording of material presupposes the need for adequate lighting, manoeuvrability within the hull and the establishment of a thorough three-dimensional grid mapping system. Siltation could prove a major factor



Figure 11. The bow of *AE2* enshrouded in nets. The anchor/tow chain can be seen exiting the hawse pipe, and below, out of picture is the single forward torpedo tube. Note the extensive damage caused by fouled fishing nets. Photo: Mark Spencer.

affecting the proper recording and excavation of any relics and pose a risk to the archaeological team members.

It is difficult to see how the internal spaces of the vessel could be adequately recorded without the sectioning of the hull into working pieces, as carried out on *Holland One*. This access requirement poses a significant level of interference to the site and would require a thorough assessment of the impacts on the retention of the physical integrity of the site. Loss of site integrity would be a contra-indication of salvage and removal of internal archaeological materials. In all cases, the survival of the archaeological record is paramount and if this cannot be ethically recorded in accordance with established international practice, and with its context and long term survival assured, then archaeological excavation should never proceed.

It would be a disaster for *AE2* if its material remains were recovered in a fashion which paid little concern to individual site context, or where poor removal, conservation and storage were undertaken. The archaeological value of the collection and its potential for meaningful research and public interpretation would be severely diminished. Similarly, the dissemination of the collection upon retrieval would be a disastrous outcome.

As an adjunct to the above, a component of *AE2*'s significance is its context in the Sea of Marmara where the vessel operated and subsequently sank. Return of *AE2* to Australia, or even Istanbul, would by necessity, reduce these contextual values (see Nutley, n.d.).

Recommendations

The site and the artefact collection are deemed of such significance that they must be protected at all cost. A management and conservation strategy should be implemented to include the site, the artefact collection and record collection. All interventionist processes at the site must be guided by this plan. A comprehensive

environmental assessment of the wreck site should be undertaken in order to determine its structural condition. Provisions of Turkish cultural heritage legislation should be enforced where applicable, together with international conventions and codes of conduct to ensure the long-term survival of the site.

The Australian Government should request the Turkish Government, through its Ministry of Culture, to establish a site surveillance regime at the site. Processes to protect the site from current fishing activities should be examined, to ensure that no unintentional damage is caused which would affect the site's integrity. A further aim would be the continued identification of the site's archaeological research potential. If deemed appropriate, salvage and conservation of the site's material remains must be undertaken in close consultation with the Australian Government to ensure the long-term survival and archaeological significance of the ensuing collection.

The thorough pre-disturbance archaeological inspection of the remains should be continued as a minimum level of archaeological recording. This inspection should be conducted with the endorsement of the Turkish Ministry of Culture and undertaken by appropriately qualified personnel under the direction of a professional maritime archaeologist. The investigation should aim to establish the external condition of the hull and identify the environmental characteristics of the site.

While the public interest in seeing *AE2* raised once more in all its marine covered glory is appreciated (or relics belonging to the site), the complexities of site disturbance on such a massive scale appears to contra-indicate such a course. Recovery of the hull is certainly achievable—scientifically recording, stabilising, conserving and managing the resulting structure appears a far more onerous problem. The arguments for recovery have not yet been addressed. The archaeological site is non-replaceable. It survives as a fascinating example of Australian naval endeavour and a monument to the futility of war. Interest generated by the discovery should now be harnessed to examine the most appropriate way to protect *AE2*, while allowing the world's communities to learn from and experience the fragile remains.

Conclusion

Mr Selçuk Kolay's dedicated search for *AE2* has been fruitful. Project *AE2* has identified the significance of the site and the need for a coordinated and comprehensive plan of management in order to preserve its unique characteristics. This phase of *AE2*'s chameleon life must now begin. The submarine's integrity and significance is of paramount concern and should be the focus of all ensuing discussions regarding *AE2*'s unknown future.

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References

Primary sources

Bell, S.T.C.E.R.A., n.d., *Statement by T.S. Bell, C.R.R.A late submarine AE2*. The Royal Navy Submarine Museum, Gosport, England. Acc. No. A1991/348.

- Boyle, C., Lt. Commander, 1915, *Official report (log) of HM Submarine E.14 in the Sea of Marmara from 27 April–18th May, 1915*. The Royal Navy Submarine Museum, Gosport, England.
- Brown, H., 1916, *Diary of Herbert Brown aboard AE2*. Mitchell Library/State Library of NSW, Sydney. MS Microfilm CY2662.
- Knaggs, A.E., A.B., 1915–16, *Diary of Albert Edward Knaggs RAN*. The Royal Navy Submarine Museum, Gosport. Acc. No. A1984/131.
- Marsland, J., A.B., 1914–1915, *Diary of ABJ. Marsland aboard AE2*. Reprinted in *Naval Historical Review*, Dec: 1974: 51ff.
- Mitchell, D., 1917, *Note Book No.7: General submarines* (includes E-Class). Compiled by D. Mitchell: Ships draughtsman, Submarine Design Office, Admiralty, London.
- Mitchell, D., 1918, *Submarine sketch book no.4*. Compiled by D. Mitchell: ships draughtsman, Submarine Design Office, Admiralty, London.
- Nichols, A.C., A.B., 1915–18, *Diary of A.C. Nichols, A.B., member of the crew of HMA SM AE2, Prisoner of War of the Turks 1915–1918*. Naval Historical Section, Department of Defence, Canberra.
- Stoker, H.G., Lt. Commander, 1919, *Official report to the Admiralty re: movements of HMA Submarine AE2 from 25th April–30 April, 1915*. Dated 9 January, 1919. The Royal Navy Submarine Museum, Gosport., England. Acc. No. ADM 137/2077.
- Stoker, H.G., Commander, 1925, *Straws in the wind*. Herbert Jenkins, London (2nd edn).
- Suckling, C., 1913–1918, *Personal account of service on AE2 from time of outfitting in 1913 to internment as prisoner of war*. Australian War Memorial, Canberra. Acc. No. 3DRL/6226.
- Wheat, J.H., 1915–1918, *Transcript of original diary maintained in a Turkish POW camp detailing the work of the AE2 in the Dardanelles*. Australian War Memorial, Canberra. Acc. No. 3DRL/2965.
- Secondary sources
- Akermann, P., 1989, *The encyclopaedia of British submarines 1901–1955*. Anthony Rowe Ltd. Wiltshire.
- Barker, D., et al., 1997, *Conservation of the submarine, Holland I: A practical overview. Metal 95: Proceedings of the international conference on metals conservation*. James & James (Science Publishers) Ltd: 286–290.
- Bowyer, M., 1999, *Resurfacing the Resurgam. Immersed: The International Technical Diving Magazine*, 4.4: 40–44.
- Brenchley, F., 1998, *In deep water*. *The Bulletin*, 22 December 1998: 32–33.
- Chatterton, E.K., 1935, *Dardanelles dilemma: The story of the naval operation*. Rich & Cowan Ltd, London.
- Cleere, H., 1993, *The underwater heritage and the World Heritage Convention*. *Bulletin of the Australian Institute for Maritime Archaeology*, 17.2: 25–26.
- Commonwealth of Australia, *Diplomatic Note to the Embassy of the Republic of Turkey*, 23 May, 1996. Department of Foreign Affairs and Trade. Canberra (confidential).
- Foord, R.C., WOCD, 1996, *Report of overseas visit to Turkey [Restricted]*. Department of Defence–Navy, Canberra.
- Frame, T., 2000, *The shores of Gallipoli: Naval aspects of the Anzac campaign*. Hale & Iremonger, Maryborough. Victoria.
- Frame, T. and Swinden, G.J., 1990, *First in last out: The Navy at Gallipoli*. Kangaroo Press, Sydney.
- Garland, P., 1989, *Australia's first submarines, the AE1 and AE2: A Select Bibliography*. I.C Library, HMAS Platypus, Sydney.
- Goodheart, A., 1999, *In the depths of history: Take it or leave it. Preservation: The Magazine of the National Trust for Historic Preservation*. Jan–Feb 1999: 36–45.
- Gregory, D., 2000, *In situ corrosion studies on the submarine Resurgam: A preliminary assessment of her state of preservation*. *Conservation and Management of Archaeological Sites*. London, 4: 93–100.
- Halpern, P.G., 1994, *A naval history of World War I*. UCL Press, London.
- Horton, E., 1974, *The illustrated history of the submarine*. Sidgwick & Jackson, London.
- Hosty, K., 1995, *A matter of ethics: shipwrecks, salvage, archaeology and museums*. *Bulletin of the Australian Institute for Maritime Archaeology*, 19.1: 33–36.
- Jameson, W.S., Rear Admiral Sir, 1962, *Submariners V.C*. Peter Davies, London.
- Jameson, W., 1965, *The most formidable thing*. Rupert Hart-Davies, London.
- Jose, A.W., (ed.), 1987, *The Royal Australian Navy 1914–1918. The Official History of Australians in the War of 1914–1918*, by C.E.W. Bean. Vol IX. University of Queensland Press, Brisbane.
- Kemp, P., 1990, *British submarines of World War One*. London.
- Laffin, J., 1980, *Damn the Dardanelles!: The story of Gallipoli*. Doubleday, Sydney.
- Lewis, T., 1997, *Sensuikan I-124: A history of the Imperial Japanese navy fleet submarine sunk in Northern Territory waters*. Coleman Printing, Darwin.
- MacLeod, I., 1989, *The application of corrosion science to the management of maritime archaeological sites*. *Bulletin of the Australian Institute for Maritime Archaeology*, 13.2: 7–16.
- McCarthy, M., 1991, *The Flamingo Bay voyage: Including reports on the Japanese submarine I 124*. Report—Western Australian Maritime Museum. No.45: 1–52.
- McCarthy, M., 1998, *The submarine as a class of archaeological site*. *Bulletin of the Australian Institute for Maritime Archaeology*, 22: 61–70.
- Murphy, L., (ed.), 1998, *H.L. Hunley site assessment*. Submerged Cultural Resources Unit, National Parks Service. US Department of the Interior, Sante Fe, New Mexico.
- Nutley, D., n.d., *Underwater cultural heritage management. Internal report for the Department of Planning*, Sydney: 1–12.
- O'Keefe, P.J., 1993, *The European Convention on the Protection of the Archaeological Heritage—relevance to maritime archaeology*. *Bulletin of the Australian Institute for Maritime Archaeology*, 17.2: 27–30.
- Riley, J., n.d. [1988], *The waterline theory of iron ship disintegration*. In: McCarthy, M. (ed.), *Iron ships and steam shipwrecks. Papers from the first Australian seminar on the management of iron vessels and steam shipwrecks*. Western Australian Maritime Museum, Perth: 191–197.
- Sellars, W., 1999, *Diving into the past: Australian history in a Turkish sea*. *Scuba Diver*, Jan-Feb 1999: 62–63.
- Smith, T., 1998a, *Project AE2: Inspection of a shipwreck in Turkey thought to be His Majesty's Australian submarine AE2*. NSW Heritage Office, Sydney.
- Smith, T., 1998b, *Return to Gallipoli: The discovery of the WWI Australian submarine AE2*. *Heritage NSW* (Quarterly newsletter of the NSW Heritage Office and Heritage Council of NSW), December 1998: 14.
- Smith, T., 1999a, *Project AE2: The Inspection of the AE2 wreck site*,

- Turkey. NSW Heritage Office, Sydney.
- Smith, T., 1999b, Submarines by the sea full: The Pacific's unique archaeological resource. *Bulletin of the Australian Institute for Maritime Archaeology*, 23: 79–85.
- Spencer, M., 1999, The search for AE2. *Wartime: Official Magazine of the Australian War Memorial*, Winter: 13–15.
- Spencer, M., 1999, AE2—unsung hero of Gallipoli. *Australian Warship Review*, 3: 5–12.
- Swindon, G., 1996, Navy blue Anzacs. *Australian Sea Heritage*, Autumn 46: 14–16.
- Thomson, M., 1996, Will our historic submarine AE2 ever grace Darling Harbour? *Sydney Afloat*, August: 18–19.
- Turkish cultural heritage legislation, 2863 sayılı Kültür ve Tabiat Varlıkları Kanunu (1983).
- Wester-Wemyss, G.C.B. Lord, 1924, *The navy in the Dardanelles campaign*. Hodder and Stoughton, London.
- White, M.W.D., 1992, *Australian submarines: A history*. AGPS, Canberra.

Endnotes

- ¹ Dr Don Walsh, ex-submariner, oceanographer and pioneer in the Trieste deep dive experiments in 1960, informed Dr Mark Spencer that the halocline is particularly strong in the Dardanelles. He noted that it was an old submarine captain's trick to use these sharp density differences for hovering without using much power. They could also be used to hide above or below to avoid sonar beams (Dr Walsh to Dr Mark Spencer, 1997, pers.comm., 24 Nov. See also: White, 1992: 66).
- ² According to Mr Selçuk Kolay, the *E.7* lies in the Dardanelles in 40 m of water, near Anakkale and was partly salvaged. The only other E-Class submarine lost in the Sea of Marmara, *E.20*, is probably located in approximately 700–800 m about 15 n miles north-east of Marmara Island (Mr Selçuk Kolay, 1997, pers. comm.).
- ³ Historic photographs suggest that the insignia 'AE2' and the vessel's pennant number, '2' or '81', were painted on the hull and conning tower respectively. There is no evidence for raised letters or a name plate being affixed to the external hull.
- ⁴ Mr Bob Mealings, Royal Navy Submarine Museum at Gosport, noted that *E.17's* conning tower and artefacts from *E.3* are held by the museum, while *E.24's* conning tower is thought to be in the possession of a Dutch diver (Mealings, R., 2000, pers.comm.).
- ⁵ Turkish Regulations Regarding Maritime Traffic in the Turkish Straits and Sea of Marmara.
- ⁶ Commonwealth of Australia, 'Diplomatic Note to the Embassy of the Republic of Turkey', 23 May 1996. Department of Foreign Affairs and Trade (confidential).
- ⁷ Bell recalls how Stoker told the crew to get ready with something white, as they surfaced (Bell, n.d.). Wheat also states that the crew 'had to surrender' (Wheat, 1915–1918: 15). A painting of the capture of *AE2* on display at the Naval Museum in Istanbul, is entitled, 'The Surrender of *AE2*' and shows a crew

member waving a white piece of cloth. The date of the painting, its accuracy in depiction, or propaganda motive has not been ascertained. The painter was a contemporary of the *AE2* mission, having lived between 1874–1958 (viewed by author, 1997/8).

- ⁸ After consideration of financial and political support for such a venture, discussion of issues of site context, adequately trained personnel and appropriate plant, developed research design, excavation strategy, adequate storage and conservation facilities, long term monitoring, collection management processes, display venue etc.