

Scuttled in the Morning: the discoveries and surveys of HMS *Warrior* and HMS *Sparrowhawk*, the Battle of Jutland's last missing shipwrecks

Innes McCartney

Bournemouth University, Department of Archaeology, Anthropology & Forensic Science, Fern Barrow, Talbot Campus, Poole, Dorset BH12 5BB, UK

Due to the circumstances of the loss of HMS *Warrior* and HMS *Sparrowhawk* in 1916, in which subsequent to disablement both had drifted and been towed unknown distances from the Jutland battlefield, they were not located in the 2015 Jutland survey. In August 2016 both ships were located and HMS *Warrior* was revealed to be a pristine warship wreck, the only example in this condition of the 25 ships sunk in the battle. HMS *Sparrowhawk* had a similar pattern of disturbance as seven of the other Battle of Jutland destroyer wrecks. The survey of these wrecks draws to a conclusion a long period of discovery at Jutland and raises questions as to how these important cultural artefacts should be treated in the future.

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The Battle of Jutland, fought 31 May to 1 June 1916, saw the two most powerful battle fleets in the world clash off western Denmark. More skirmish than battlefleet action, the German High Seas Fleet, having unintentionally encountered the entire British Grand Fleet, slipped into the mists of the North Sea and escaped. But in the 16 hours in which this drama unfolded, 25 ships were sunk and 8500 lost their lives. The Grand Fleet lost 14 of the ships and around 6000 of the sailors killed. Two of the 14 losses are the subject of this article.

In April 2015 the author partnered with the Danish Sea War Museum Jutland to locate and survey with swath bathymetry and ROV the shipwrecks sunk in the Battle of Jutland 1916. Of the 25 ships sunk, 22 were located and surveyed (McCartney, 2016). In 2016 two further expeditions into the North Sea followed, which were in part aimed at finding the last three missing shipwrecks. In March 2016, SMS *V4* was found along with the stern portion of HMS *Indefatigable* (McCartney, 2017a). Finally, in August 2016, the survey pinpointed the locations of HMS *Warrior* and HMS *Sparrowhawk*.

The losses of both of these last two ships share common features in that they occurred not in battle, but in the hours afterwards as their battle-damaged remains finally succumbed to the sea, with the survivors

being rescued by passing allied warships returning to Britain. It was known that both vessels were disabled in battle, drifted without power, and were then towed an unknown distance before being scuttled (Harper, 1927). This meant that they would probably be the most time-consuming to locate because it was thought that they would lie outside of the main battlefield area. With the mission of surveying as many of the Jutland shipwrecks as possible in the time allowed in 2015 they had consequently been of low priority. However, the results of the 2015 survey once analysed revealed that the chronology of the Battle of Jutland produced by the Royal Navy's navigation school in 1919, known as the *Harper Record* (Harper, 1927), represented a very accurate spatial depiction of the battle (McCartney, 2016: 243–247). This was encouraging because it gave positions for the losses of both the missing ships, giving us a good starting position for both searches.

As it turned out, the position given for HMS *Warrior's* loss was the most inaccurate in the entire *Harper Record* by a very considerable margin. The wreck lies 25 miles from the Harper position. Comparison of the Jutland wreck-sites with Harper's estimated positions showed the average discrepancy to be 3.5 nautical miles (McCartney, 2016: 244). *Sparrowhawk* lies six miles from the Harper position (Fig. 1). As described here, an additional destroyer

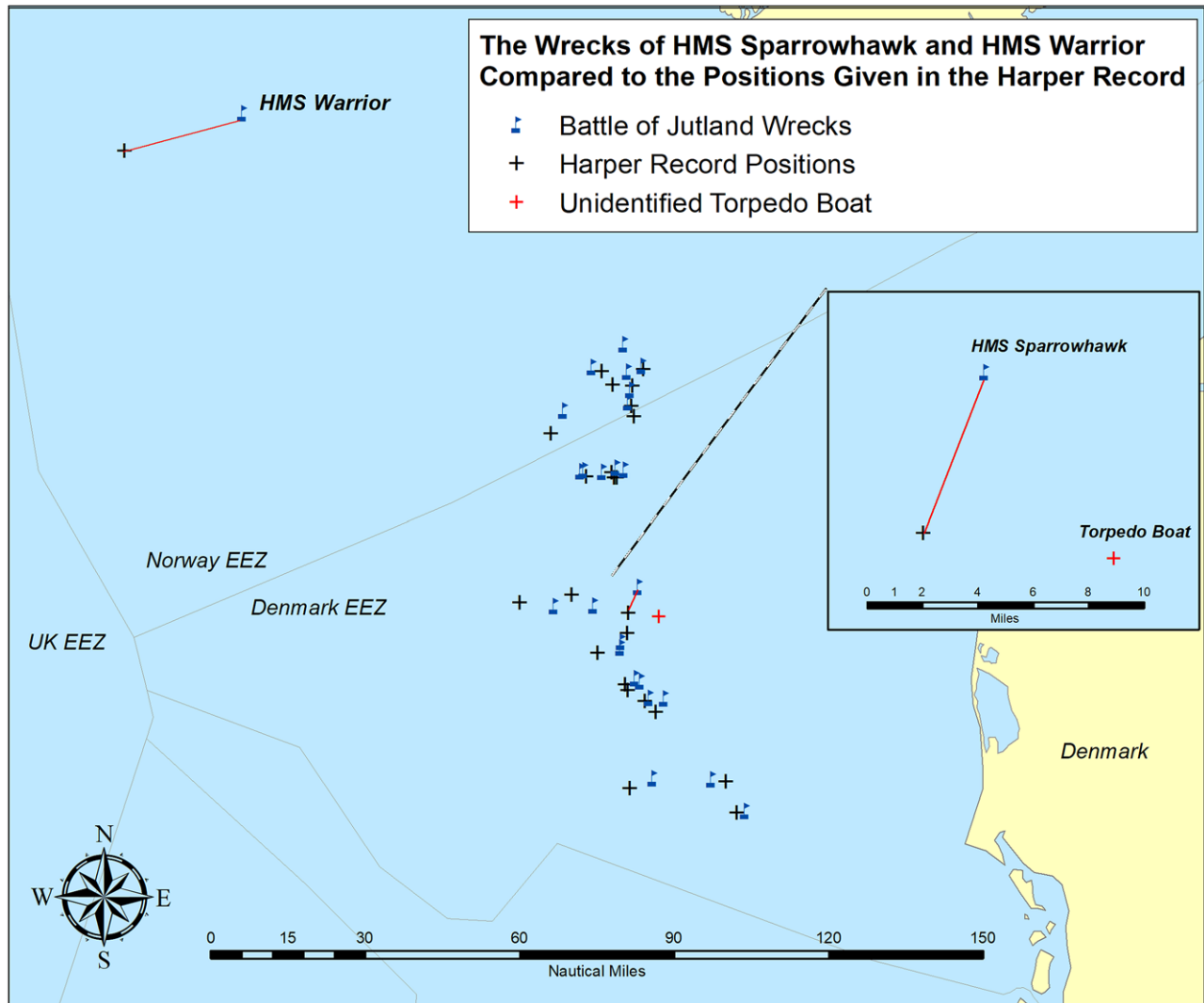


Figure 1. The locations of the wrecks of HMS *Warrior* and HMS *Sparrowhawk* shown in relation to the other wrecks of the Battle of Jutland and the positions given in the Harper Record. ‘Site B’ wreck, possibly an S138-class German torpedo boat, is marked with a red cross (Innes McCartney).

wreck was located to the east of Harper’s position for *Sparrowhawk*. This also had to be eliminated as a candidate for *Sparrowhawk* during the survey work.

HMS *Warrior*

The armoured cruiser HMS *Warrior* was the named ship of its class of four, *Warrior*, *Achilles*, *Cochrane*, and *Natal*. They were the penultimate class of armoured cruisers built by Britain but by the time of the Battle of Jutland, little more than 10 years after HMS *Warrior* was launched, it was an obsolete ship. The primary reason for this was the development of the dreadnought version of the armoured cruiser; the first battlecruiser, HMS *Invincible*, was launched in 1907, just two years after *Warrior*, and was also lost at Jutland.

The *Warrior* class displaced 13,767 tonnes, was 154m long and 22m wide (Fig. 2). Their main armament was made up of guns mounted in single turrets, 6 × 9.2-inch and 4 × 7.5-inch. The 9.2-inch guns were mounted forward and aft and in the pairs of turrets mounted nearest to the foremast and mainmast. These turrets slightly overhung the line of the upper deck, a feature that helped in confirming the ship’s identity.

The 7.5-inch turrets were mounted two a side in the centre of the ship. HMS *Warrior* represented the apogee of the armoured cruiser concept, particularly in the arrangement of all of the main guns on the upper deck enabling them to be fired in any sea state. The ships of this class were renowned for being excellent sea boats and stable gun platforms, leading to them being regarded as the best cruisers Britain had ever built (Parkes, 1966: 441–447).

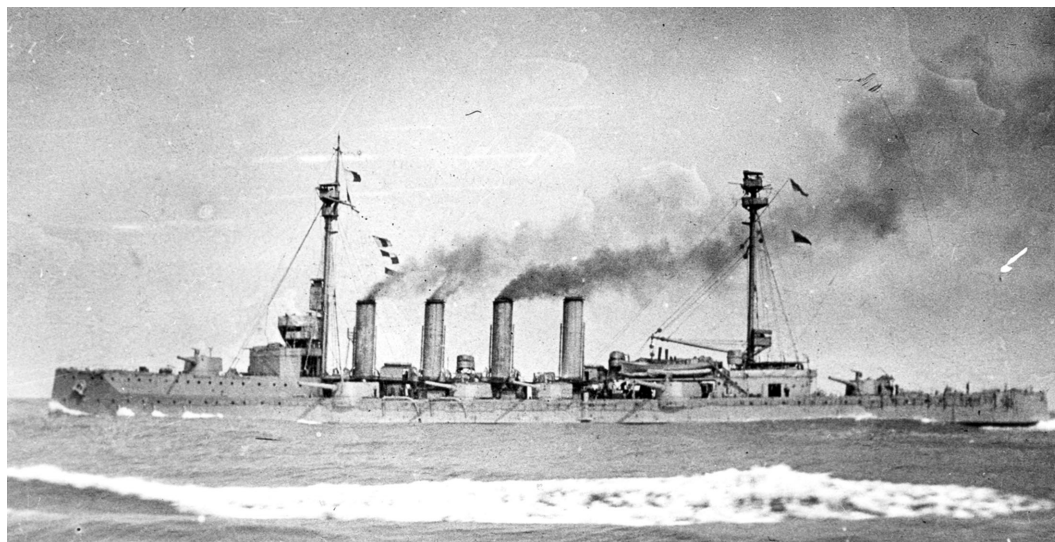


Figure 2. HMS *Warrior* in the North Sea, date unknown. The guns are traversed as if on firing exercise (Richard Osborne Collection, World Ship Society).

The sinking of HMS Warrior

Although past their prime, armoured cruisers were employed in two squadrons by the Grand Fleet in a scouting role during the Battle of Jutland. This role was originally planned to have been carried out by the battlecruisers, but they had been formed into a separate unit, the Battle Cruiser Fleet operating independently out of Rosyth. So the old armoured cruisers were used to fulfil the battlecruiser's role (McCartney, 2016: 89).

The all-armoured First Cruiser Squadron (1CS) was made up of HMS *Defence* (Rear Admiral Sir Robert Arbuthnot commanding), HMS *Warrior*, HMS *Duke of Edinburgh*, and HMS *Black Prince*. Only *Duke of Edinburgh* survived the battle. During the outset of the brief fleet action at the height of the battle, the 1CS came fatally close to the German battle line. It seems that Arbuthnot attempted to finish off the damaged German light cruiser SMS *Wiesbaden*. In doing so, 1CS passed into the space between the two battle fleets and unwittingly became a target for the van of the German Fleet, receiving damage it was never designed to withstand. HMS *Defence* was peremptorily sunk with all hands (McCartney, 2012: 56–58).

At the time of *Defence's* loss, only *Warrior* was directly in line astern, as the other two ships had been sailing as detached wings of the battle fleet. It seems at least *Duke of Edinburgh* was attempting to rejoin the line at this time and *Black Prince* was further behind. Under fire initially from the German battlecruisers at the head of the German fleet and then by the van of the battlefleet itself, *Defence* exploded at around 18:19. By this time, *Warrior* had already been fatally damaged and turned away north-west to seek relief behind the British line (Harper, 1927: 38).

According to the reports filed by *Warrior's* commanding officer, Capt. V.B. Molteno, as soon

as *Warrior* turned away it was noticed that the ship was rapidly losing speed. Within ten minutes news was received on the bridge that both engine rooms were disabled. But as they filled with seawater, the ship's propellers kept revolving and took *Warrior* out of danger. Turning for base, the small seaplane carrier HMS *Engadine* was spotted and signalled to stand by. A photograph shows HMS *Warrior* as seen from *Engadine* at this time (Fig. 3).

By 20:00 it was clear that seawater was almost filling both engine rooms and that *Warrior* would soon come to a stop, so was taken in tow by *Engadine*. Towing continued all night, but by 07:45 it was clear that despite heroic efforts, *Warrior* was going to sink and had to be evacuated. The crew was transferred to *Engadine* and *Warrior* was abandoned. In the hope that the ship might later be towed by a larger vessel in calmer seas, all water-tight doors were shut and the ship was left adrift (Admiralty, 1920: 289–295). Capt. Molteno's post action report lists 67 crew killed and one missing. They went down with the ship (TNA ADM 137/302).

Discovery and survey

That *Warrior* had been cast adrift meant that any calculation as to where it actually sank could only be roughly estimated. So despite the fact that both *Warrior* and *Engadine* fixed the position where the ship was abandoned, it was not likely that it would be found nearby. The weather at the time of abandonment is known to have been blowing from the south-west at around force 5–6 (Meteorological Office, 1916: 153 and TNA ADM 137/302: 398). So it seemed that the wreck may possibly be found further east than the abandonment point. This proved to be the case.

After several other wrecks had been surveyed and ruled out, the wreck of HMS *Warrior* was located in the

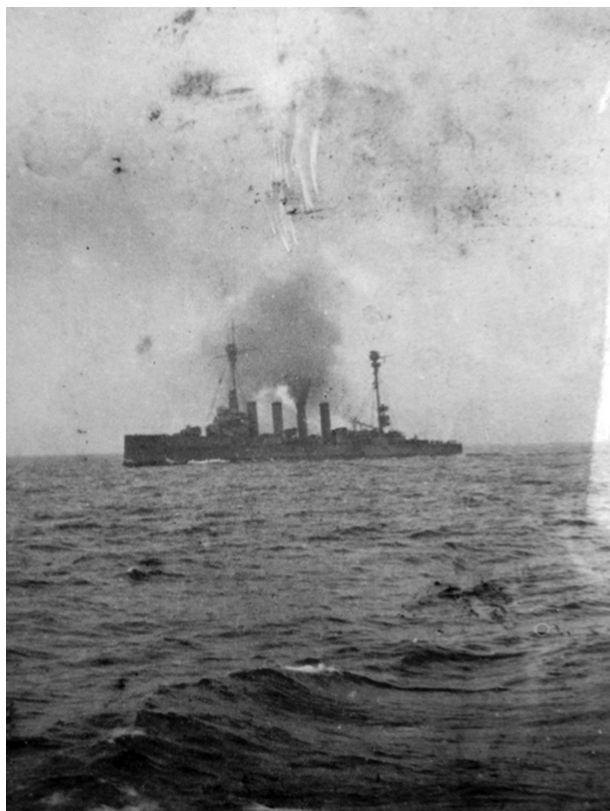


Figure 3. The last-known photo of HMS *Warrior* taken at around 18:40 on 31 May 1916 when HMS *Engadine* came to her aid (National Museum of the Royal Navy).

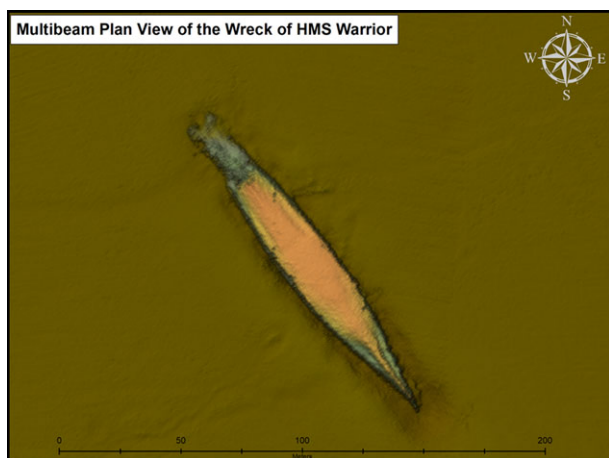


Figure 4. The digital terrain model of HMS *Warrior* as located on multibeam in the evening of 24 August 2016. The wreck appeared to be completely upside-down (Innes McCartney/Sea War Museum Jutland).

late evening of 24 August 2016 at a position recorded in Danish records held by Sea War Museum Jutland as a net snag (Fig. 4). The wreck points to the south-east and was measured at the correct length and width for HMS *Warrior*. On the digital terrain model (DTM) it

looked as if the wreck was completely upside-down and therefore few of the readily identifiable features could be seen. Inspection by ROV was required to ascertain for certain that the wreck was HMS *Warrior*, but also to attempt to discern the manner of its sinking. The ROV was deployed at 23:00 and aside from the ROV's lighting the wreck was in complete darkness throughout the inspection, explaining the dark character of the images.

The ROV passed from the northerly end of the wreck down the north side and around the bow. In the stern area the rudder was seen to have been flattened into a near horizontal position (Fig. 5A). Both propellers were present and one is visible in Figure 5B. Both propeller shafts and the rudder were observed to have been bent so that they lay with a bias to the starboard side of the wreck. The ROV then moved to the level of the upper deck and the curved overhanging structure of the after starboard side 9.2-inch gun barbette could be seen (Fig. 5C). The turret itself is mainly buried and there is no clearance under the wreck. The armoured wall of this turret was seen to have split along a join in the armoured plate (Fig. 5D), probably because it is one of the structures supporting the entire weight of the ship. In the foreground of Figure 5D is a section of the mainmast, which was observed to be running out from under the body of the wreck at this point.

The ROV continued along the starboard side of the ship at the seabed level (Fig. 6). The remains of a pinnacle with its distinctive propeller was seen just forward of the visible portion of the mainmast (Fig. 6A). The underside of the overhanging barbette (now inverted) of the forward of the 9.2-inch gun turret on that side of the ship was visible (Fig. 6B). Under it, a portion of the foremast could be seen poking out (Fig. 6C). This has folded back on itself and the top is buried under the wreck. The foremast passes out from under the wreck just forward of the turret (Fig. 6D). It must have fallen over the gun barrel as the ship sunk.

The bow area of the wreck was observed to be the most degraded (Fig. 7). The exposed frames at the forward end of the ship, approximately in line with 'A' turret, were recorded (Fig. 7A) beyond the forward end of the armoured citadel, at a point where at the upper-deck level no armour was fitted (Parkes, 1966: 443). Here, the thinner metal of the hull has entirely corroded, leaving a porthole to lie on the underside of the upper deck. Further forward, more portholes could be seen lying on the seabed and the frames themselves have buckled (Fig. 7B). The probable reason for this is visible in Figure 7C, as it is the sheer weight of the anchor, its hawse, and cables that is forcing this area downwards. The distinctive outer walkway of these armoured cruisers was also seen (Fig. 7D). The area shown is on the port side of the wreck, in line with 'A' turret.

Concluding remarks

The wreck lies at a general depth of 80m but the scouring around it goes down to beyond 82m (Fig. 8).



Figure 5. ROV images of the stern and after port side of the wreck of HMS *Warrior* (Innes McCartney/Sea War Museum Jutland).



Figure 6. ROV images of the central portion of the port side of the wreck of HMS *Warrior* (Innes McCartney/Sea War Museum Jutland).

The wreck is almost entirely upside-down. Its SE/NW orientation is consistent with a vessel that had drifted beam on to the prevailing weather as reported at the time. The noticeable holes in the DTM line with the engine room were not examined by ROV. They may well turn out to be the exit holes of the rounds which sunk

the ship. This cannot be known for certain until the wreck is examined again in the future.

The survey of the wreck shows that it must have sunk stern first. It was last seen heavily down by the stern. It seems probable that the stern may have temporarily embedded itself in the seabed when the ship hit bottom.



Figure 7. ROV images of the fore section of the wreck of HMS *Warrior* (Innes McCartney/Sea War Museum Jutland).

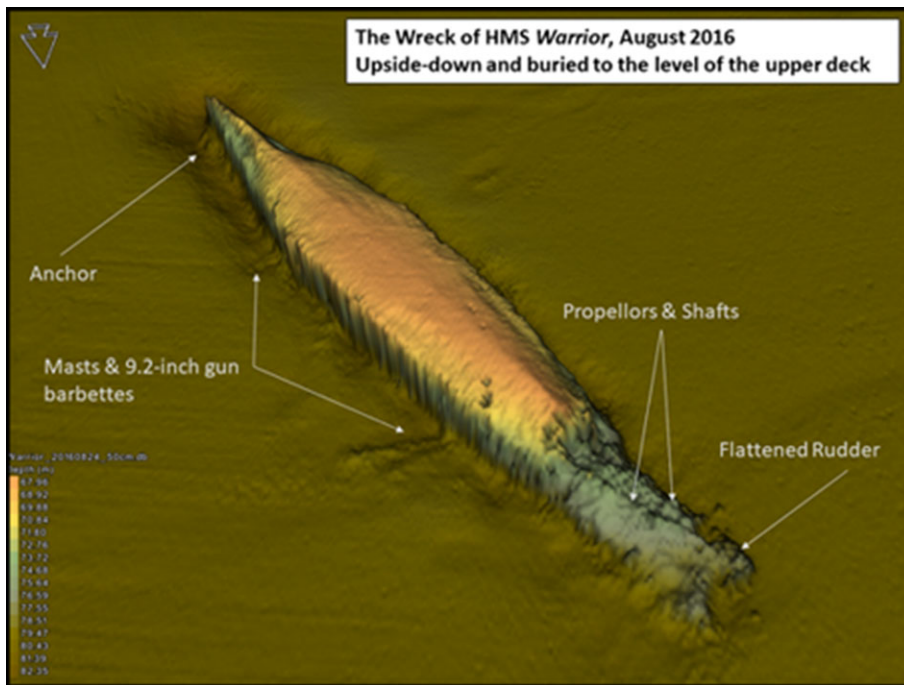


Figure 8. How features observed on the wreck of HMS *Warrior* are located as shown on a multibeam rendering of the wreck (Innes McCartney/Sea War Museum Jutland).

Being nearly twice as long as the sea is deep its bows would have risen into the air and the weight of the upper works would have twisted it upside-down as it descended to the bottom. It must have been inverted when it settled to account for the masts being crushed underneath it, as they are. This also explains how the

rudder was twisted through 90 degrees and the propeller shafts were bent.

A very surprising feature is the distance the wreck was found from the Harper position (as described earlier). Moreover, the position given by Harper for where the ship sank is not the same as that reported

by Capt. Molteno (Admiralty, 1920: 293). In fact, Molteno gave two different positions. The first was the point recorded for the abandonment as agreed by both *Warrior* and *Engadine*. This was subsequently amended to 15 miles further north (magnetic) (Admiralty, 1920: 293), which by the variation in the area in 1916 is 13.25 degrees west of due North (Gordon, 1996: 605). Interestingly, both of these positions plot an implausibly long 60 nautical miles west of the wreck. Clearly something isn't quite right.

Harper may have noticed in 1919 that some element of Molteno's reckoning was odd. Because when the *Harper Record* was completed, the sinking position given is closer to where *Warrior* actually lies, but still over 25 miles from the wreck (Harper, 1927: 110). He would have known from the reports from *Warrior* and *Engadine* that the slowly settling ship was heavily down by the stern with decks awash and was considered likely to survive less than three hours (Admiralty, 1920: 293 and TNA ADM 137/302: 398). Under such conditions he must have concluded that *Warrior* would not have drifted far before foundering. So why did he move the Molteno position further east by 35 miles?

The answer may lie in the fact that the speed *Engadine* measured while towing *Warrior* seems too fast. Initially it was measured at 8.2 knots, then by morning at 6 knots (Admiralty, 1920: 292). It seems this may have been overly optimistic. Certainly a slower progress under tow would bring the Molteno position nearer to the wreck-site. But it also opens the possibility that *Warrior* may have drifted unmanned for several more hours than previously thought.

Another cruiser, albeit significantly smaller, was lost on 1 June 1916 while immobile and drifting. SMS *Wiesbaden*—coincidentally the ship *Warrior* was trying to dispatch when it was fatally holed—is known to have drifted for several hours at a speed of one knot (McCarty, 2016: 132–133). A similar rate of progress for HMS *Warrior* would mean that it may have stayed afloat for more than 24 hours. However implausible this may be, it cannot be ruled out from the evidence that now survives. But in reality a combination of factors including a slower towing speed, navigational inaccuracy, and a drifting ship all conspired to create the positional discrepancy we see today.

HMS *Sparrowhawk*

HMS *Sparrowhawk* was an Acasta-class destroyer built to Admiralty design by Swan-Hunter in 1912. It was the identical sister ship to HMS *Shark* which was also sunk during the Battle of Jutland. The Acasta-class displaced 1090 tonnes and was 81.5m long and 8.2m wide. The sleek design of British destroyers—the Germans referred to comparable vessels in the High Seas Fleet as torpedo boats—is shown in Figure 9. The 20-ship class of Acastas were the first British destroyers to be fitted with all 4-inch gun main armament, with three guns of this type fitted and a pair of torpedo tubes.

They were capable of at least 29 knots, powered by twin shafts and turbines, and four Yarrow-type boilers (March, 1966: 124–132).

At the time of the Battle of Jutland, HMS *Sparrowhawk* was part of the Fourth Flotilla, based at Scapa Flow. It was made up of destroyers and two large destroyer leaders, HMS *Broke* (later of the Battle of the Dover Straits fame) and HMS *Tipperary*. More than a quarter of this flotilla was sunk at Jutland.

The sinking of HMS Sparrowhawk

By 23:00 on 31 May, the Fourth Flotilla was screening the starboard wing at the rear of the British battlefleet as it progressed southwards, looking to regain action with the German fleet at first light. At this time the German line, which had been to the west, crossed eastwards behind the largely unaware British, but in doing so it ran into the Fourth Flotilla (McCarty, 2016: 217). The subsequent series of night actions saw several British destroyers sunk in the darkness (McCarty, 2016: 216–237). A summary of *Sparrowhawk's* loss is given here.

It was during these confused actions that HMS *Sparrowhawk* found itself rammed twice by members of its own flotilla, ultimately succumbing to the damage sustained. At around 23:25 the flotilla leader, HMS *Broke*, just ahead of HMS *Sparrowhawk*, sighted the vague silhouette of a line of ships ahead and made the British recognition signal. The reply came in the form of the dazzling searchlights of the German fleet and a hail of fire. The British returned fire and a torpedo hit the light cruiser SMS *Rostock* at this time.

But as the line of British destroyers turned away, HMS *Broke* was hit in the bridge by a shell, jamming the helm. The ship turned full circle and slammed into the side of HMS *Sparrowhawk*, just abaft the bridge. The two ships became locked together and rapidly slowed. The onrushing destroyers behind tried to avoid colliding with the two conjoined warships, but HMS *Contest* ran into *Sparrowhawk's* stern, slicing off several feet of it, jamming the rudder, and opening the tiller flat to the sea. HMS *Broke* was able to get free and limped northwards out of the battle, heading for Britain, but *Sparrowhawk* damaged fore and aft, was now adrift and only able to turn in circles.

A narrative by survivors of *Sparrowhawk's* ordeal at night was published in 1921 (Fawcett and Hooper, 1921: 347–357). Aboard the drifting ship, in the distance the hapless remains of the burning HMS *Tipperary* could be seen, until it sank at around 02:00. Things looked bad for *Sparrowhawk* as the streaks of dawn illuminated the sky. At that time a German light cruiser emerged from the mist, but then sank much to the relief of *Sparrowhawk's* survivors. This was the light cruiser SMS *Elbing*, which had collided with its own line during the same action. At around 06:00 a raft of survivors from *Tipperary* was picked up and just afterwards the entire forward section of the ship ahead of where it had been rammed by HMS *Broke* fell off, taking the two ship's dogs, which were trapped within, to the bottom.



Figure 9. HMS *Sparrowhawk* seen from the starboard quarter in 1913. The ship's long, slim lines are easily discernible (DS.SWH/5/3/4/2/B173 Tyne and Wear Archives and Museums).

Rescue came sometime thereafter when the destroyer HMS *Marksman*, returning home, took *Sparrowhawk* in tow, but ultimately had to recover the crew and sink the ship as the tow had parted in the rising seas and the fatally wrecked destroyer could not be safely brought back across the North Sea. Considering what the ship had been through, it is perhaps surprising that only six had died.

Prior to the 2015 survey the author carried out archival research to attempt to establish the possible areas in which the missing wrecks of Jutland were located. The details of *Sparrowhawk's* movements subsequent to being disabled were difficult to discern. No after action report by HMS *Marksman* could be traced and it seemed one was not filed after the battle. Other sources conflict in a number of crucial details. For instance *Sparrowhawk's* commanding officer's post action report states that *Marksman* had come to his aid around 04:00 (Admiralty, 1920: 321 and TNA 137/302) but the account given in the 1921 narrative says it was actually 07:15 (Fawcett and Hooper, 1921: 356). HMS *Marksman's* log seems to support the latter and stated *Sparrowhawk* was sunk at 09:10, but no position is given (TNA ADM 53/48439).

Ultimately the circumstances of the loss of this ship were such that it was considered difficult to justify spending valuable survey time looking for it. This was primarily because we would be looking for two halves of the ship, separated by an unknown distance. Moreover, it could not be satisfactorily ascertained how far *Sparrowhawk* may have drifted and in what

direction. At that time the overall accuracy of the *Harper Record* had not been tested and its positional details were not considered reliable.

Discovery and survey

In the weeks after the 2015 survey, the site of a potential torpedo boat or destroyer was identified in the survey dataset. This site, Site A, subsequently identified as HMS *Sparrowhawk*, was briefly inspected by a team from the Sea War Museum Jutland using an ROV in July 2015. It looked to be a promising target but, to confuse matters, another site, Site B, had been found that also looked like a similar type of vessel. Both unidentified wrecks were within a ten mile radius of the *Harper Record's* position for *Sparrowhawk's* loss (Harper, 1927: 110). Moreover, both site's multibeam scans showed the types of dimensions we had come to associate with the German and British destroyer types in service during the WW1 period. During the 2016 surveys of March and August both of these sites were reinvestigated and HMS *Sparrowhawk* was finally identified (Fig. 1).

The DTMs of the two wrecks examined in 2016 showed wrecks that are dimensionally consistent with WW1-era destroyers. Site A looked dispersed in a similar way to that seen on several other Jutland destroyer sites (Fig. 10). The wreck at Site B appeared to be a lot more intact and seemed to have features suggesting it was of German origin (Fig. 11). This was confirmed by ROV inspection.

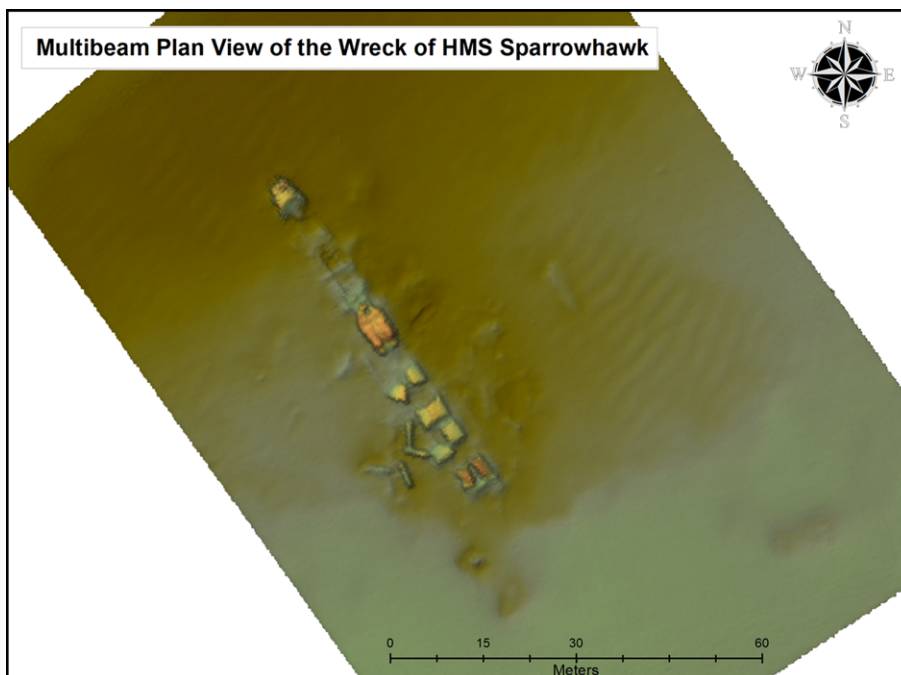


Figure 10. Multibeam plan view of the wreck of HMS *Sparrowhawk* (Innes McCartney/Sea War Museum Jutland).

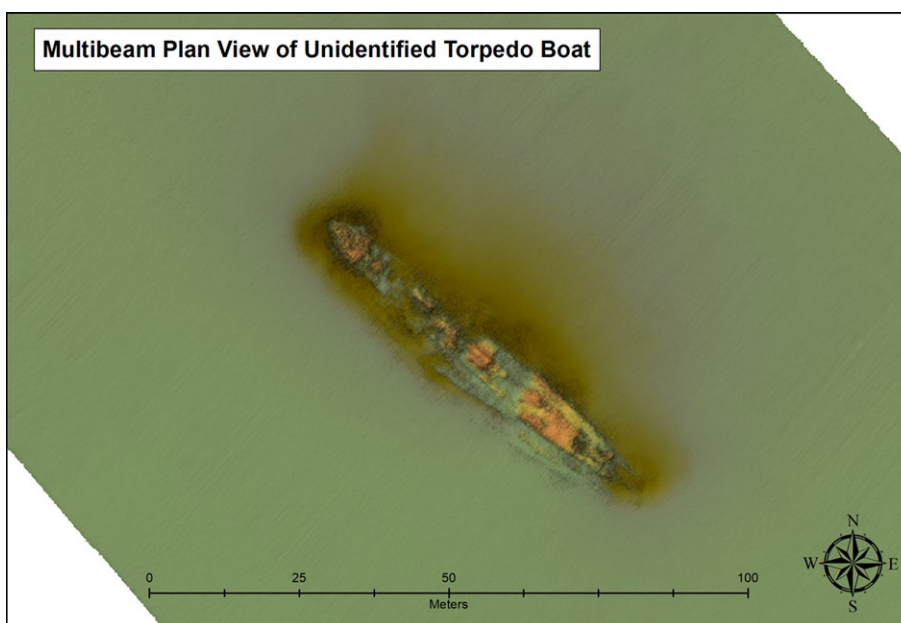


Figure 11. Multibeam plan view of the wreck of an unknown German-built torpedo boat (Innes McCartney/Sea War Museum Jutland).

Both sites were examined by ROV. The visual inspection of Site B quickly established that the wreck could not be HMS *Sparrowhawk*. It was eliminated because the wreck was equipped with triple expansion engines (Fig. 12A and B), whereas *Sparrowhawk* was turbine powered (March, 1966: 124–132). Figure 12A shows the top of the portside engine. It can be seen that the cylinders are empty and the engine appears

to have been decommissioned, or was being serviced when the ship sunk. Figure 12B shows the top of the starboard engine with the cylinder intact with a circular covering grate in place. This engine looks as if it was operational at the time of the ship’s loss.

Further confirmation that the wreck could not be HMS *Sparrowhawk* came when the boilers were



Figure 12. Images from the ROV survey of the wreck of the German torpedo boat (Innes McCartney/Sea War Museum Jutland).

examined. Figure 12C shows the downcomer pipe seen at the apex of one of the three boilers present, at the end of the steam drum. This carried water back down to both water traps, hence the Y shape. This feature is not seen on the Yarrow-type boilers fitted to HMS *Sparrowhawk* and is generally associated with the Schulz-Thornycroft design adopted by the High Seas Fleet. The curved water tubes seen in image D also conform to the German type. Yarrow water tubes were straight (McCartney, 2016: 26).

The ROV inspection of Site A showed features that confirmed the wreck is to be HMS *Sparrowhawk*. The images here are from the 2015 visit to the site when the underwater visibility was much better than in 2016. The water traps seen on the boilers are oval (Fig. 13A), which is consistent with the Yarrow type (McCartney, 2016: 26). The tubes are straight (Fig. 13B) and therefore also of Yarrow type. The turbines, seen from above, had square steam uptakes, side by side (Fig. 13C). From these steam progressed to the condensers. A large amount of ammunition was seen in the stern area (Fig. 13D). It is of British 4-inch type, as were the brass cordite containers seen on the wreck. At the extreme north-east of the wreck the rudder sticks out as the final intact part of the wreck (Fig. 13E). Finally, a chain was seen hanging down to the seabed (Fig. 13F). There are in fact two present on the wreck. These may have been part of the towing yoke used while trying to save *Sparrowhawk*. The port side propeller is partially buried in the seabed (Fig. 13F, it is notched where circled in red).

By a process of elimination this site has to be HMS *Sparrowhawk*. The established methodology of overlaying the class-correct hull plan over the

multibeam DTM (McCartney, 2016: 25) showed an exact match, proving the wreck was an *Acasta*-class destroyer (Fig. 14). No other *Acasta*-class destroyer was lost nearby that has not previously been found.

Identity of the torpedo boat site

With HMS *Sparrowhawk* positively identified, the question turned to the identity of Site B. This was slightly problematic because all of the German torpedo boats sunk during the Battle of Jutland have been found and identified previously. The last, SMS *V4*, was identified in March 2016 (McCartney, 2017a). It was fortunate when working in the Jutland battlefield that no other destroyers were found, otherwise the challenge of identifying each one would have grown more difficult. This site had the potential of requiring revision of the work previously carried out; however, it is known that all the German torpedo boat losses during the Battle of Jutland were turbine powered (McCartney, 2016: 24–25) ruling out this wreck as a Jutland casualty.

The specific identity remains difficult to resolve with certainty. This may be the wreck of a German torpedo-recovery vessel or similar. It is known that Germany reused a number of early torpedo boats in a number of miscellaneous naval roles right through to 1945 (Gröner, 1990: 172–176). These vessels were captured by the Allies and disposed of in the months after the end of WW2, some by dumping at sea. For example, SMS *V156* served as training boat during WW1. Renamed *T156* in 1917, it later served as a torpedo-recovery vessel in the Reichsmarine and Kriegsmarine. In this case, wrecksite.eu states that the ship was scuttled 3 May 1945, salvaged, and then sunk again ‘at Jutland’ 10 June

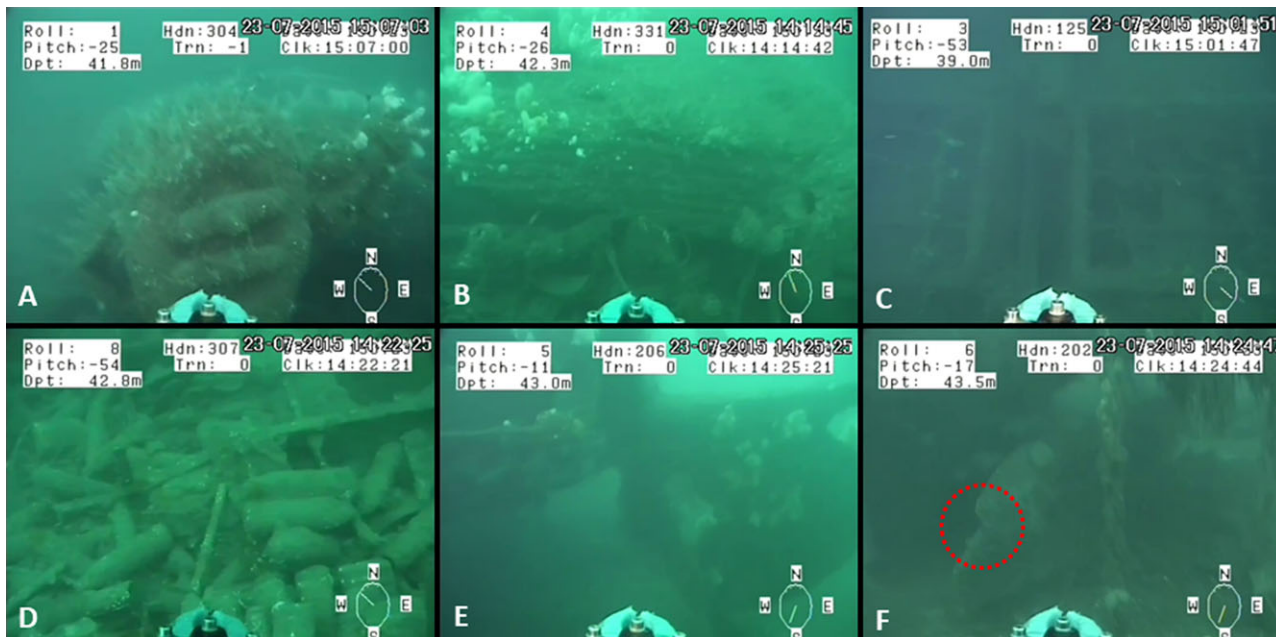


Figure 13. Images from the ROV survey of the wreck of HMS *Sparrowhawk* (Innes McCartney/Sea War Museum Jutland).

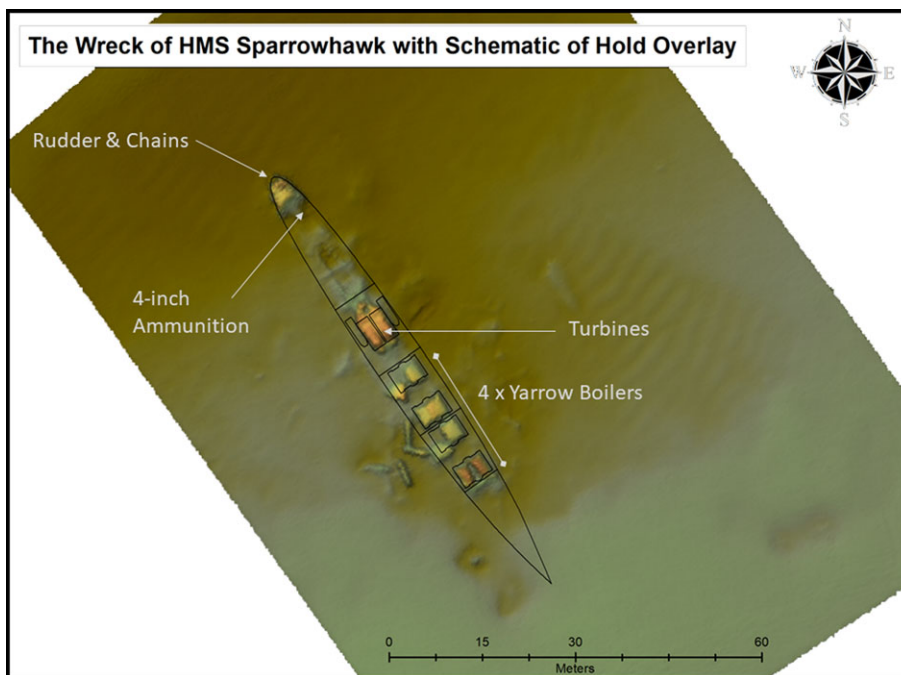


Figure 14. Multibeam plan view of the wreck of HMS *Sparrowhawk* with a schematic overlay of the hold layout of the *Acasta*-Class of destroyer (Innes McCartney/Sea War Museum Jutland).

1946 (Anon, 2018). It has not been found, but could potentially be this wreck.

V156 was one of the S138-class of torpedo boat. They were fitted with four boilers of ‘marine type’ (which usually signifies Schulz-Thornycroft) and a pair of triple expansion engines (Gröner, 1990: 172–176). The

engines were laid out in the typical German fashion of the period, in two separate compartments, with the port side engine to the rear (McCartney, 2016: 24–25). The class particulars were checked against the class drawings and a schematic of the hold layout was made and overlaid on the DTM of the wreck-site (Fig. 15).

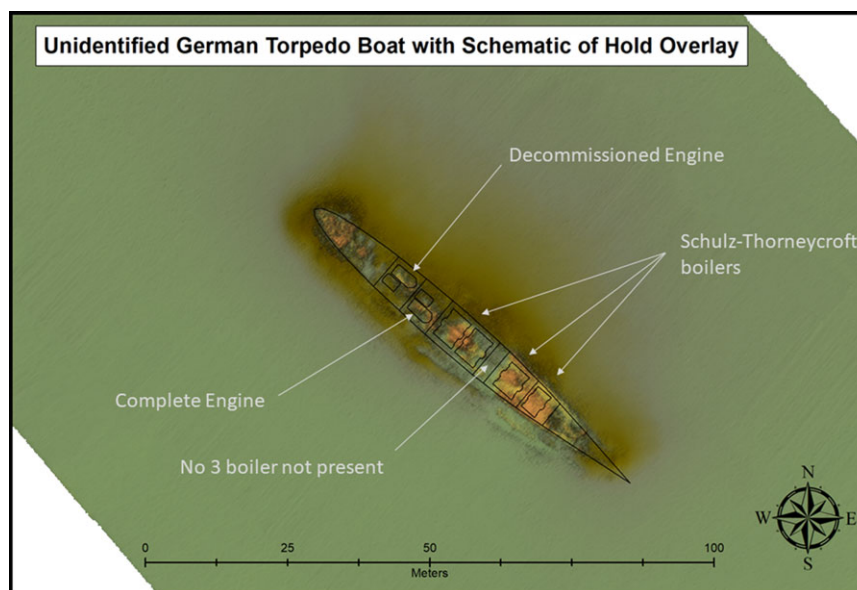


Figure 15. Multibeam plan view of the wreck of an unknown German-built Torpedo boat with a schematic overlay of the hold layout of the S138-class of German torpedo boat (Innes McCartney/Sea War Museum Jutland).

The overlay matches in most regards, with the engines and overall dimensions fitting perfectly. However, as can be seen on the DTM and on the ROV tape of the wreck, there are only three boilers present, with one appearing to be absent from the central boiler room. So in order for this to be *T-156*, or similar, some form of modification had to have taken place during the ship's life. At present, no information confirming this has been found. But it is plausible that during its conversion to a torpedo-recovery vessel a boiler was removed to make room for a hold, or similar. It is known that others of the S138-class were modified to take three boilers (Gröner, 1990: 173).

So this wreck-site may be a converted pre-WW1 torpedo boat, but its actual identity remains a mystery. Further evidence supporting it being dumped, or lost on tow to a breaker, comes in the fact that the wreck-site showed no signs of it being battle damaged. Nor were any guns, torpedo tubes, or ammunition seen. Generally, even on sites that have been salvaged in the past, ammunition, if present, is readily observed in the wreckage during surveys, as seen on all of the destroyers and torpedo boat wrecks in the Jutland battlefield, including *Sparrowhawk*.

Concluding remarks

The direction in which a shipwreck points can be helpful when assessing its potential identity; but it was not in these cases. Both wrecks are orientated in a similar direction, with the bows to the south-east. This was initially problematic when attempting to identify the wrecks, because *Sparrowhawk* was thought to have been in this orientation when it was sunk, as it is consistent with the north-west track of HMS *Marksman* shown by Harper (1919), combined

with the fact that *Sparrowhawk* was towed from the stern.

The *Sparrowhawk* site shows signs of being sunk while operational. The ammunition seen shows it was battle-equipped. It was also scuttled by gunfire, which in part may explain the dispersed nature of the wreck-site. At least one boiler may have exploded, as the steam drum was not seen at the top of boiler No. 1. This was also seen on the DTMs and ROV inspections of other Jutland wrecks where boilers were witnessed to explode, such as the case of SMS *V27* (McCartney, 2016: 74–75).

The details of the disposal of German warships after WW2 by international agreement can be found in the UK National Archives (TNA FO 371/50910). The 1945 Tripartite Agreement covers the details of all major surface units and submarines. Scuttled torpedo boats were considered 'Category C', and of little importance. *V156* is listed as being in Weser area in the American sector (TNA ADM 116/5564). It is reported to have been disposed of at sea by the US Navy in June 1946 (TNA ADM 228/28). So *V156* may be the wreck, but this remains a working theory only.

Both wreck-sites show signs of commercial salvage, consistent to that seen on seven of the other 12 destroyers and torpedo boats sunk during the Battle of Jutland (McCartney, 2017b). *Sparrowhawk's* condensers, which would have been seen outboard of the two turbines, have been removed from the wreck-site (Fig. 14). The conclusion is that at some point in the past they have been recovered for scrap, most likely without official permission. The condensers have been removed from the torpedo-boat site as well, although it is possible this happened before it was sunk.

In summary

The historic narrative of the Battle of Jutland tells that the two British shipwrecks had similar circumstances surrounding their loss, but on discovery and survey the stories behind how they sank turned out to be different. HMS *Warrior* seems to have drifted miles after it was abandoned; far further than even Harper could have calculated. This may have protected it from illegal salvors who might have tried to find it in the past. But it will not remain hidden forever and its future as the last intact Jutland wreck is now in doubt unless some form of protection is forthcoming. In this regard, the positional analysis discussed has been kept deliberately numbers-free. Conversely, HMS *Sparrowhawk* was found to have sunk near the Harper position. This wreck was identified using both visual and geophysical methods, as successfully employed on the other Jutland wreck-sites. This uncovered that its condensers have been salvaged.

The location and survey of HMS *Warrior* and HMS *Sparrowhawk* draws to a close the long process of hunting down and recording each shipwreck sunk during and in the immediate aftermath of the Battle of Jutland. They are now all known entities and have at least been recorded visually and with geophysics. With this article, the results of each case have now been published. Whereas much more work could be done on each site to learn more about them and the

circumstances of their sinking from the archaeological remains, the basic process of mapping the battlefield and recording what is there is now complete. With this phase of discovery at Jutland drawing to a close the question of what should be done with the wrecks must now be decided.

As has been consistently shown since the surveys in 2015, the wrecks have been exploited legally and illegally as economic resources for the valuable metals they contain (McCartney, 2017b). It is the contention of this article that only HMS *Warrior* has been free of any kind of artefact removal or salvage. It is therefore the last remaining intact wreck from the greatest naval battle ever seen in the northern hemisphere. It is sincerely hoped that this wreck can still be saved from the criminality so evident on the Jutland wrecks and elsewhere in the world.

Ratification of the 2001 UNESCO Convention by Britain is desirable in the light of these cases. But any degree of protection for HMS *Warrior* and the other Jutland wrecks that goes further than words requires action by the British and European maritime security authorities. The recent innovation of employing satellite monitoring on shipwreck sites under threat offers the opportunity to identify suspicious vessels. It is hoped this technology will be applied to monitor what is left of the Jutland battlefield before even more is illegally removed.

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Due to a processing error, the uncorrected proof version of this article was unfortunately published online on 22 June 2018. The proof corrections have now been incorporated and this is the fully corrected final version of the article, published online on 03 July 2018. The publisher apologizes for this error.