

SS Richard Montgomery 2006 Survey Report



Executive Summary

In September 2006 the Maritime and Coastguard Agency commissioned a repeat high-definition multi-beam sonar survey, in order to gather information about the current state of the wreck of the SS Richard Montgomery. In particular, information was sought on the state of the hull of the vessel, any changes to the known cracks and the shape of the surrounding seabed with its ongoing pattern of erosion and deposition.

The survey used a high resolution Reson 8125 multibeam sonar mounted on an Independent Sonar Head Attitude and Positioning system. This provided detailed images of higher resolution than earlier surveys of the wreck.

The survey of the wreck confirmed that there have been no significant changes between the 2005 and 2006 investigations. The key observations made during the 2006 survey are:

- The orientation, list and pitch of the two sections of the wreck remain unchanged since 2005.
- The 2m gap under the forefoot of the bow, which was observed in 2005, is now fully supported by sediment.
- The condition of the hull continues to be one of slow deterioration.
- Improved methodology in data acquisition enabled visualization of cargo in lower hold 3 and upper hold 2.

A survey of 64,000m² of seabed around the wreck was also undertaken. This was of sufficient resolution to identify and position scattered debris, including all the 2005 targets; no significant changes were apparent. A clear topographical representation of these sediments was generated and comparisons made with previous surveys. Although minor changes have been observed between the 2005 and 2006 surveys, they are not significant and are unlikely to influence the stability of the wreck.

Introduction

The *SS Richard Montgomery* was a Liberty Ship built by the St. John's River Shipbuilding Company, Jacksonville, USA in 1943. The ship sailed from the USA to the UK as part of a convoy in summer 1944 with a cargo of munitions, of which approximately 1,400 tons Net Explosive Quantity (NEQ) is still in the forward section. On arrival in the Thames Estuary the vessel was directed to anchor in the Great Nore Anchorage, off Sheerness. On the next tide, however, the ship's anchor dragged and it drifted on to a bank running east from the Isle of Grain north of the Medway Approach Channel. The ship grounded amidships on the crest of the bank and shortly afterwards broke in two. The aft section of the ship was salvaged at the time.

Background

In September 2006 the Maritime and Coastguard Agency commissioned a high-definition multi-beam sonar survey from ADUS St Andrews University, in order to gather information about the current state of the wreck of the *SS Richard Montgomery*. In particular, information was sought on the state of the hull of the vessel, any changes to the known cracks and the shape of the surrounding seabed with its ongoing pattern of erosion and deposition.

Visibility on site is notoriously bad and for this reason the use of remote sensing such as multibeam sonar provides more reliable information than can be achieved by diving on the wreck.

The three-dimensional images which were acquired during this survey provide a unique 'snapshot' of the wreck in 2006.

Survey Methodology

The 2006 survey encompassed not only the hull but also the masts, overhanging rigging and debris around the wreck and between the two sections of the wreck. It visualized all evident splits, cracks, buckling and apertures of any significant size. A detailed topographical survey of the surrounding seabed out to 400m was also undertaken.

Because of the detail provided by the survey and the fact that it is fully geo-referenced, the 2006 survey can be used as a datum against which any future surveys can be measured and will therefore allow comparisons and a greater understanding of the rate of deterioration.

The survey used a high resolution Reson 8125 multibeam sonar mounted on an Independent Sonar Head Attitude and Positioning system. This provided detailed images of higher resolution than earlier surveys the wreck.

The Reson Seabat 8125 sonar covers a 120° swath on the seafloor consisting of 240 dynamically focused beams. The 8125 uses focused true time delay beam forming to provide an excellent level of detail. Up to 240 soundings are collected with every pulse of the multibeam across the swath and this can happen up to 40 times per second depending on the depth of water.

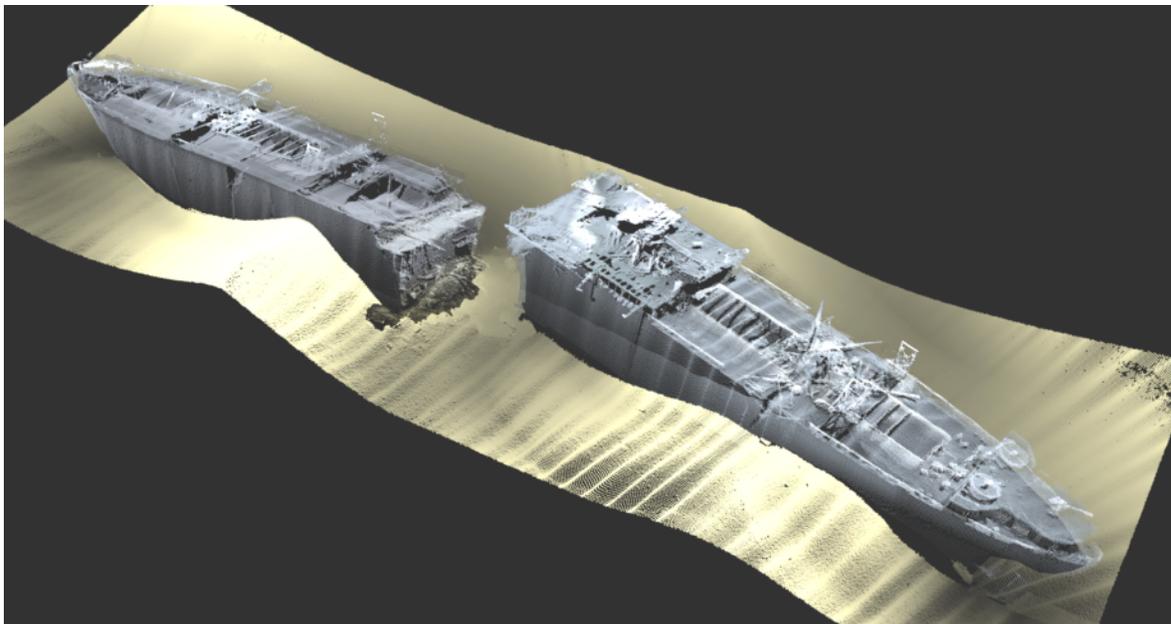
The multibeam and positioning system used for this survey allowed all the main features of the wreck surveyed in 2005 and 2006 to be relatively positioned to centimetric accuracy, and absolutely to within c.10cm.

Rather than following a pattern of regularly spaced lines, the helmsman made use of the digital display of the seabed and wreck on the helm monitor to ensure full coverage of the area survey. As this was in real-time, it was possible to identify gaps and then go back and fill them in. The detailed survey of the wreck was accomplished at high and low slack water, with a mixture of parallel and thwart-ship runs to ensure total coverage of all surfaces of the wreck.

A Trimble 5700 RTK base station was relocated at the position used for the 2005 survey; point GP1 located on the Fort at Garrison Point, within the Sheerness Docks complex of Medway Ports, approximately 3km from the site of the *Richard Montgomery*.

Survey Findings - Hull

The wreck still looks in remarkably good condition. The results of the 2005 and 2006 surveys indicate that there are some structural problems with the hull, which is consistent with other wrecks of a similar age.



Although detailed information was collected about both sections of the wreck, and a detailed analysis was undertaken of the whole wreck, attention was focused on interpretation of the bow section data since this contains the munitions.

Orientation, List and Pitch

The attitude of the wreck is the same as in 2005. It is still in two sections with the break at the bulkhead between the aft end of Hold 3 and the Engine Room.

The forward section of the wreck to the north is aligned 1° east of UTM grid north, lists 17° to starboard and lays bow down by approximately 9°.

The aft section is aligned 12° east of UTM grid north, lists 14° to starboard and lays with the stern down by approximately 3°.

Evidence of Hogging

The 2006 data indicates that both sections of hull are hogged and that this has not changed measurably since 2005.

It is probable that there is still moveable sediment under parts of the hull. The forefoot which was unsupported for approximately 2m back from the stem in 2005, now appears to be resting on sand. As there has been no increase in depth over the bow, it is likely that this is due to a replenishment phase in a cycle of sand movement at that location.

In 2005, it was noted that the forefoot at the bow was lower than the rest of the forward section and could possibly drop still further if supporting sediment is removed by current diverted around the bow (although this is not currently the case).

Although flexing of the forward section could exacerbate the deterioration of the structure, there has been no measurable movement in the last 12 months. A comparison of nine points either side of the major portside split of deck plating adjacent to Hold 2 shows no significant changes in height difference either side of the split between 2005 and 2006. What changes there are can be accounted for by loose debris on the deck combined with limitations of the positioning system used to locate the measurement points.

Deterioration Due to External Forces

The numerous apertures in the wreck as a whole provide evidence that some corrosion is active and ongoing.

In particular, the relatively thin plating of the bulwarks is corroded all around the wreck and a number of apertures in the main deck and on the boat deck are evident. These are likely to be constructed of thinner steel than the 5/8" (15.5mm) of the hull plating. Other evidence of corrosion can be seen in the irregular shape of most apertures and edges to splits.

The hull is in two parts. It is broken at the forward end of the deck-house where it meets the aft end of the hatch opening for Hold 3. However, below the 'Tween deck, the hull is broken at frame 88, the bulkhead between Hold 3 and the Engine Room .

The hull separation, which happened when the vessel sank in 1944, has caused extensive collateral damage in the area and most visible elements of the structure have irregular edges, splits and apertures in the immediate vicinity.

The sonar evidence suggests that the contents of lower Hold 3 are largely constrained by the bulkhead whereas the boiler end of the Engine Room is open. However, the overhanging boat deck prevents a clear sonar image of the aft interior being collected using a surface-mounted sonar system.

Perforations of the bulkhead and in the portside hull plating allowed good sonar evidence to be collected from within lower Hold 3. The 2006 data shows very clearly regular stacking of bombs up to a height of at least 7.5m from the deck of the hold.

A significant proportion of the upper part of Hold 3 is exposed where the deck-house has separated from the forward section of the wreck. An area the full width of the ship and 5m long is exposed, and a section of the weather deck above, along the port side of the hatch, is known to have collapsed in the past. There are no obvious differences between the 2005 and 2006 surveys of this area.

Deterioration Due to Internal Forces

Distortion in the area of Hold 2 identified in earlier surveys (probably as a result of the weight of the cargo) is still apparent in 2006. On the starboard side there is a longitudinal crease in the hull plating at 'Tween deck level running for 11m from a major split to the aft end of Hold 2. Below this the side of the ship just above the turn of the bilge has been pushed outboard by up to 2m. Forward of the split there appears to be a 4m long aperture just detectable at the turn of the bilge.

On the opposite (port) side there is bulging of c.0.5m at seabed sediment level, with a slight, but perceptible, increase in the 12 months between recent surveys. There is still a c.20cm deflection inwards above this, below 'Tween deck level. This is all indicative of substantial weight in the upper hold bearing down on the deck and deforming the supporting hull plating, which will have already been weakened by the large split at this point.

The weight of the hull and the ordnance inside the forward section is obviously providing a continuous downward force. Although there has been no apparent change since 2005, should the supporting sediments be removed by currents, it is possible that further hogging and settling of the hull could occur.

The weight of the ordnance is also causing an outward force, with maximum pressure probably at the turn of the bilge on the starboard side by Hold 2. This effect is likely to become more significant as the steel of the hull continues to corrode.

Cargo

Contemporary records relating to the *SS Richard Montgomery* indicate that ordnance was salvaged from the vessel soon after it went aground and that the aft section was completely cleared.

Previous surveys have provided little direct evidence for *in situ* cargo thought to be in the forward section of the wreck. The improved methodology used during the 2006 survey provided valuable information about the contents of lower Hold 3 and upper Hold 2. This confirms that salvage of the forward section was only partial at best, as ordnance is stacked to a height of at least 7.5m in lower Hold 3 and 2.5m in upper Hold 2.

There were apertures in all three forward holds that gave acoustic returns. In upper Hold 2 on the port side, material is stacked to a height of c.2.5m above the level of the Tween deck, suggesting that these upper holds are not empty. Although the relatively thin split

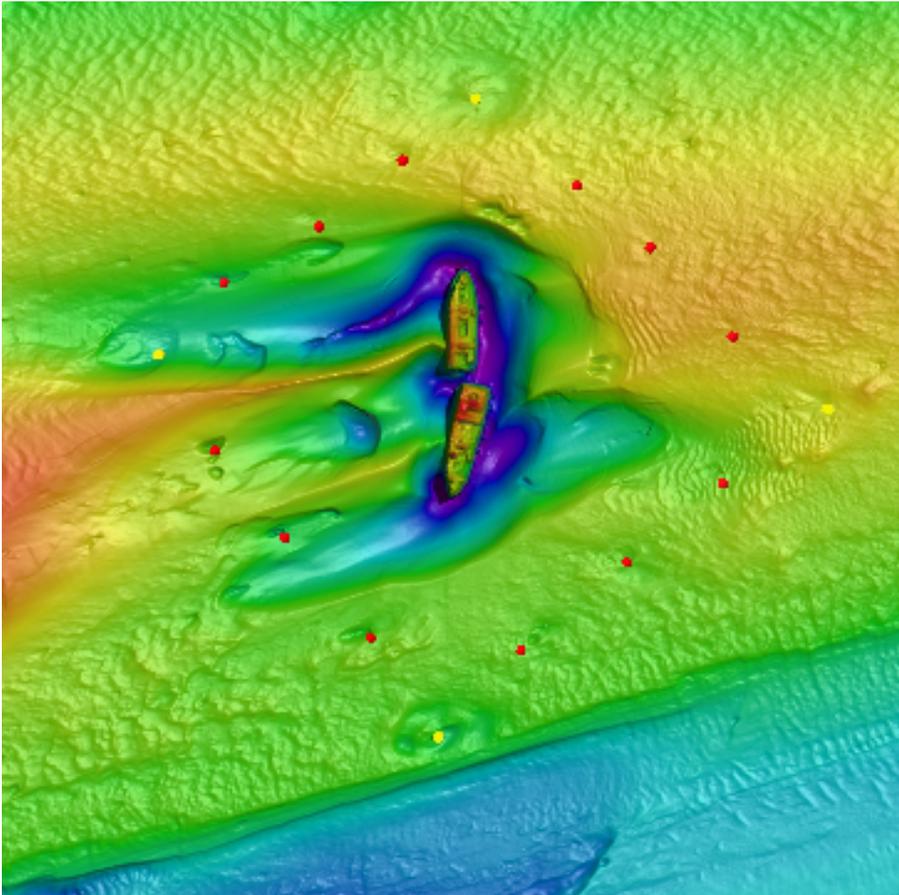
in the deck head above limits this, the cross-sectional information in two of the 2006 survey lines shows clear indications of box-like features.

The combined evidence suggests that all of the original cargo in the forward lower holds is likely to survive *in situ*, together with at least some in the forward upper holds.

A comparison between the three multibeam surveys undertaken in 2002, 2005 and 2006 indicates that no change has taken place in the size and shape of the debris, much of it presumably spilt cargo, on the seabed between the two sections of the wreck.

Survey Findings - Seabed

A survey of 64,000m² of seabed around the wreck was also undertaken. This was of sufficient resolution to identify and position scattered debris, including all the 2005 targets; no significant changes were apparent. A clear topographical representation of these sediments was generated and comparisons made with previous surveys. Although changes have occurred between the 2005 and 2006 surveys, they are not significant and are unlikely to influence the stability of the wreck.



An area around the wreck is marked with twelve red danger buoys and four yellow navigational buoys at cardinal points. Each buoy's position is indicated in the figure above and, in some cases, their sinkers and associated scour can be identified on the seabed close to the buoys.

General Observations

Three important features are the fore, main and mizzen masts with seven of the nine original cargo handling booms still attached to the mast houses. The three masts are substantial structures, each with a considerable mass leaning to starboard.

Four of the original eight 20mm anti-aircraft gun tubs survive without their guns, but the larger bow and stern tubs still have their 3" 50 calibre guns *in situ*.

Other significant features are the 4-bladed propeller and rudder, the remains of an anti-torpedo net cage and four substantial structures on the weather deck for life-rafts.

Conclusion

The improved resolution of the 2006 survey confirms that there is a substantial quantity of ordnance in the forward section of the wreck. Definite stacking of bombs is evident in lower Hold 3 and cases are apparent in upper Hold 2.

The forefoot now appears to be resting on the seabed, whereas in 2005 it was unsupported for a length of c.2m. Although this will help prevent hogging of the forward section of the wreck, movement of the sediments in the future may impose additional strain on the hull.

The corrosion of plating and the major discontinuities in the hull identified in the 2005 survey has not changed significantly in the last 12 months.

Severe bulging and distortion of hull plating either side of Hold 2 were recorded in 2005. Since then barely perceptible changes have been detected but these are so small as to be difficult to measure.

Further surveys will be undertaken in the future to ensure that the condition of the wreck is appropriately monitored.