Analyses have been undertaken to identify timber and ballast samples collected from the site, as well as small artefacts such as ceramic and glass fragments

Working from within the excavation grid, Irini Malliaros (Silentworld Foundation) carefully retrieves and packs a wooden sheave from one of *Endeavour*'s rigging blocks. Image James Hunter/ANMM

Cook's *Endeavour* found

Identifying an iconic shipwreck using a 'preponderance of evidence' approach

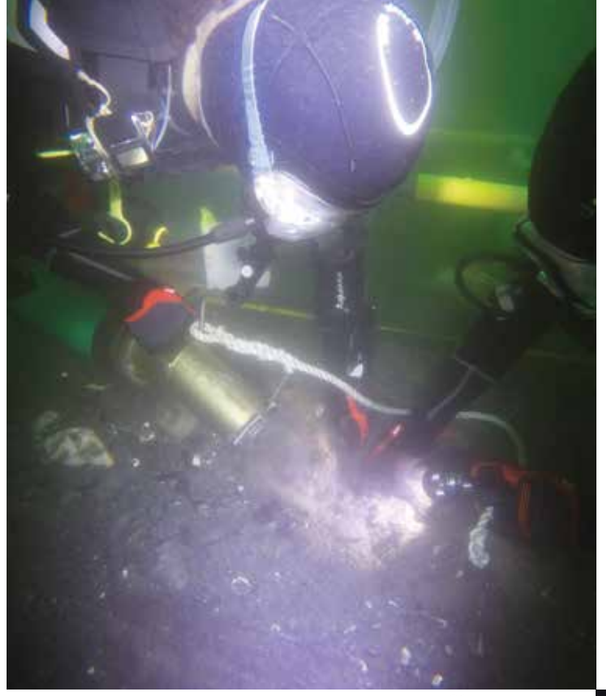
On Thursday 3 February 2022, the museum's Director Kevin Sumption PSM hosted a press conference in which he stated that HMB *Endeavour* had been found in Newport Harbor, Rhode Island, USA. This was the culmination of more than two decades of research by the museum and the Rhode Island Marine Archaeology Project. The museum's maritime archaeologists Kieran Hosty and Dr James Hunter set out the evidence.

It is with great pride that after a 22-year program of archival and archaeological fieldwork, and based on a preponderance of evidence approach, I have concluded that an archaeological site known as RI 2394, located in Newport Harbor, Rhode Island, USA, comprises the shipwreck of HM Bark Endeavour.[1]

HIS MAJESTY'S BARK *ENDEAVOUR* is an important vessel in Australian maritime history and one that elicits mixed opinions. For some, the Pacific voyage led by James Cook between 1768 and 1771 embodies the spirit of Europe's Age of Enlightenment, while for others it symbolises the onset of colonisation and subjugation of First Nations peoples. Less well understood in Australia is *Endeavour*'s subsequent life as a British troop transport and prison ship caught up in the American War of Independence. It was in this capacity – and renamed *Lord Sandwich* – that the vessel was deliberately sunk in Newport Harbor, Rhode Island in 1778.[2]

When *Endeavour* returned to England in 1771, it largely passed out of public view. It was used as a naval transport before being sold to private owners, who renamed the bark *Lord Sandwich* and used it to ferry troops to the American colonies in support of British military campaigns. By 1778, the vessel was in poor condition and relegated to gaoling American prisoners of war in Newport Harbor. When American and French forces besieged Newport, *Lord Sandwich* was one of 13 vessels scuttled (deliberately sunk) to blockade the town's harbour from an attacking French fleet. It was never salvaged and remained on the seabed where it sank.

In 1998, two Australian historians, Mike Connell and Des Liddy, established the connection between *Endeavour* and *Lord Sandwich* via archival research. Their work was expanded upon by members of the Rhode Island Marine Archaeology Project (RIMAP), which resulted in the state of Rhode Island laying claim to the wrecks of all ships scuttled in Newport Harbor in 1778. This claim was upheld by the District Court of the US Federal Government, which granted the Rhode Island Historical Preservation and Heritage Commission (RIHPHC) responsibility for protecting these shipwrecks – including *Lord Sandwich* (ex-HMB *Endeavour*) – and regulating archaeological investigation of them.



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In 1999, Paul Hundley, curator of the museum's USA Gallery and a maritime archaeologist, developed a collaborative program with Dr Kathy Abbass, the head of RIMAP, to locate the shipwreck site of *Lord Sandwich*. This relationship led to a series of joint archaeological expeditions in Newport Harbor in 1999, 2000, 2001, 2002 and 2004. The expeditions employed remote sensing of Newport Harbor, underwater survey by divers and analysis of samples of stone, coal, timber and sediment raised from a range of shipwreck sites of 18th-century vintage. Using a 'preponderance of evidence' approach developed by RIMAP and the museum in 1999, none of these shipwrecks exhibited characteristics indicative of *Lord Sandwich*.

The museum's collaborative work with RIMAP resumed in 2015 and included diver-based surveys that investigated a large area of Newport Harbor's seafloor. However, it was new archival research conducted in the United Kingdom the following year by the museum's Head of Research, Dr Nigel Erskine, that led to a breakthrough in determining where in the harbour *Lord Sandwich* was scuttled. Dr Erskine located a letter written in August 1778 by the Agent for Transports in Newport that noted *Lord Sandwich* (368 tons, British-built) was scuttled with the transports *Peggy* (250 tons, North American-built), *Yowart* (272 tons, British-built), *Mayflower* (197 tons, British-built) and *Earl of Orford* (231 tons, North American-built) between the northern end of Goat Island and the North Battery in Newport.[3]

Two major revelations resulted from Dr Erskine's research: 1) the search area within Newport Harbor where *Lord Sandwich*'s wreck site was likely to be found was significantly reduced; and 2) *Lord Sandwich* was clearly the largest vessel, by 100 tons or greater, of the five transports scuttled between Goat Island and the North Battery – an area the team dubbed the 'Limited Study Area', or 'LSA'. Between 2017 and 2019, five historic shipwreck sites within the LSA were archaeologically investigated: RI 2396, RI 2397, RI 2578, RI 2393, and RI 2394. Two – RI 2396 and RI 2397 – were later identified as one shipwreck.[4]

The LSA's two largest shipwreck sites, RI 2578 and RI 2394, were flagged as the most likely candidates for *Lord Sandwich*. RI 2578 comprises a 14-metre by 8.2-metre linear stone ballast pile interspersed with iron kentledge (ballast blocks). The site features eroded ship's timbers that are thought to be associated with the ballast pile. Although a substantial iron anchor and small iron cannon are also present, RI 2578's overall size is too small to match *Lord Sandwich*, nor does it exhibit other characteristics consistent with that vessel.

RI 2394 is noticeably larger than RI 2578 and exhibits visible remains that cover an area measuring 18.2 metres long by 7.3 metres wide. It comprises a linear stone ballast pile with a line of partially exposed articulated timber frames (ribs) of substantial size along its eastern periphery. Four iron cannons are also wholly or partially visible above the seabed, as is a lead scupper. Analyses have been undertaken to identify timber and ballast samples collected from the site, as well as small artefacts such as ceramic and glass fragments.

In 2019, the RIMAP–ANMM team was joined by a maritime archaeologist from the Silentworld Foundation and completed a more comprehensive archaeological survey of RI 2394. Permission was obtained from RIHPHC to collect timber samples from a variety of exposed hull components, including frames, ceiling (internal) planking, and a stanchion (vertical post). Analysis by Australian- and US-based experts revealed all sampled timbers were hewn from British/European species of white oak.

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Archaeologists Irini Malliaros (Silentworld Foundation, left) and Kieran Hosty (Australian National Maritime Museum) use a water induction dredge to excavate between the ship's floors (lower ribs). Image James Hunter/ANMM

02
One of the key diagnostic features located during the January 2020 excavation was the stump of one of *Endeavour*'s bilge pump shafts. The discovery of this wooden tube allowed the archaeologists to calculate the length of the vessel's keel and compare that information with original archival drawings. Image James Hunter/ANMM

When American and French forces besieged Newport, *Lord Sandwich* was one of 13 vessels scuttled to blockade the town's harbour from an attacking French fleet

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No single piece of data is sufficient to positively identify a particular shipwreck site

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Another diagnostic tool used by the archaeologists was the systematic sampling of many of the ship's timbers. Vice Admiral Michael Noonan, Australia's Chief of Navy and a former RAN diver (left), assists Kieran Hosty in collecting timber samples from the site. The white patch in the foreground is an epoxy resin that is used to seal off the timber after retrieval of the sample. Image James Hunter/ANMM

02
Archaeologists uncovered the ship's keel and associated limber or drainage channel – a notch cut in the inboard face of an external plank used to collect water in a ship's bilge – in September 2019. Sampling of the keel indicated it was constructed of European elm – a firm indication the ship was British or European built. Image Irini Malliaros/Silentworld Foundation

Armed with this information, the team submitted a successful proposal to RIHPHC to conduct limited excavation of the wreck site. The primary aims of excavation were to expose portions of its surviving hull structure for comprehensive recording and sampling, including accurate scantling (timber measurement) information. Exposed timbers and timber sections, while indicative of a large vessel, were too degraded to provide accurate measurements or samples that could be positively identified. Excavation also enabled the team to locate and measure the wreck site's keel and compare it to dimensions of *Endeavour*'s keel as recorded in Admiralty surveys from 1768. In January 2020 (at the height of winter in the northern hemisphere and with water temperatures hovering around 2 degrees Celsius), the team uncovered the stump of a bilge pump shaft and finally had an identifiable reference point within the hull to work from. When a site plan of RI 2394 was superimposed over *Endeavour*'s 1768 Admiralty plans, the locations of the surviving pump shaft, pump well and centreline all aligned. The superimposed imagery also enabled the team to predict the locations of the wreck site's bow and stern if it was indeed *Lord Sandwich*.

Regrettably, planned fieldwork during summer 2020 was affected by the Covid-19 pandemic and resulting inability of the Australian team to travel to Newport.

Aware of the need to locate the ends of RI 2394's hull and calculate the length of the keel, as well as provide additional archaeological support to RIMAP, the museum contracted Dr John Broadwater to represent the museum during the fieldwork. Dr Broadwater is a respected American maritime archaeologist and renowned specialist in 18th-century British and North American shipwrecks and ship construction.

Fieldwork conducted in September 2020 refined the extent and composition of the bilge pump well and collected additional timber scantlings that confirmed RI 2394 was a large, robustly built, flat-floored 18th-century vessel. The team also reported the northern end of the site was heavily degraded, had most likely been affected by laying of electrical and/or telecommunication cables and retained very little identifiable hull structure. During the 2021 Australian summer, the museum's maritime archaeology team reviewed the findings of the previous fieldwork seasons and predicted that *Lord Sandwich*'s bow would have faced to the south when it was scuttled, as prevailing winds during August tend to blow from the south-east. This theory correlated to the predictive model generated from the superimposition of the RI 2394 site plan and *Endeavour* Admiralty plans, and enabled the team to predict where the bow end of the keel would be located.

With Covid-19 travel restrictions still in place, the museum again contracted Dr Broadwater and a maritime archaeologist and remote sensing specialist, Joshua Daniel, to represent us during fieldwork conducted at RI 2394 in the summer/fall of 2021. Using calculations provided by the museum's maritime archaeology team, Dr Broadwater and Mr Daniel excavated at intervals along the line of the keel and located the bow at its predicted location. Not entirely convinced they had located the bow, the team excavated around the end of the keel and located a scarph (joint) where it attached to the stem (the vertical post that joined both sides of the bow). The scarph was remarkably well preserved, and its size and form corresponded exactly to that shown on the 1768 Admiralty plans of *Endeavour*.

No single piece of data is sufficient to positively identify a particular shipwreck site, and there is a risk the identification process can be influenced by 'ruling theory', in which researchers' emotions, political ambitions or cultural inclinations lead them to ignore information that overrules their hypothesis or theory in favour of information that confirms it. With this in mind, in 1999 the museum – in consultation with RIMAP – developed criteria that would have to be met for *Endeavour*'s wreck site to be positively identified.

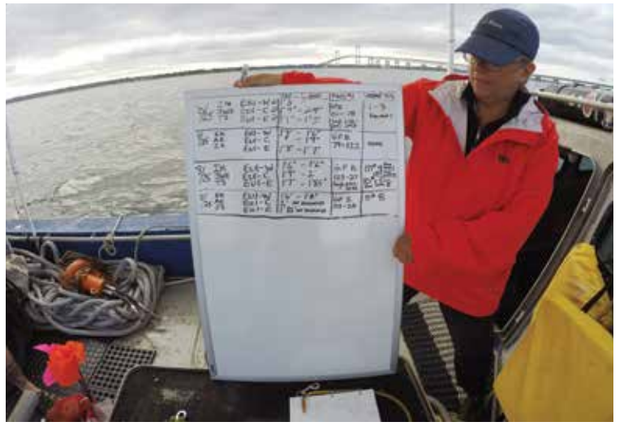
These criteria were revisited in 2018 when Dr Abbass travelled to Australia for the museum's Archaeology of War conference, and both organisations agreed to continue use of this 'preponderance of evidence' approach to identify the site.

Using that approach, we can now confidently state:

- A historical account written by Lieutenant John Knowles, the British officer responsible for scuttling the transports in Newport Harbor, states *Lord Sandwich* was sunk along with four smaller transports between the northern end of Goat Island and the North Battery. Additional archival research in 2021 indicates one of those sunken transports, *Earl of Orford*, was very likely re-floated and returned to service.[5] Additional archival research also indicates the three remaining transports scuttled in the LSA (*Peggy*, *Yowart* and *Mayflower*) were all significantly smaller than *Lord Sandwich*.[6]
- Timber scantlings recorded at RI 2394 are a close match for those listed for *Endeavour* in 1768 (as described in survey reports produced by the Admiralty when the vessel entered Royal Navy service) and in 1775 when it was sold out of service. The scantlings are also too large for the other scuttled transports in the LSA, all of which are at least 100 tons smaller than *Lord Sandwich*.

01
Dr Kerry Lynch (RIMAP) recording excavation units, context and strata details during the September 2019 field season. While stratigraphy can occur on some underwater sites, archaeologists tend to excavate by 'spits', an archaeological excavation unit of a designated or assigned depth and extent. Image James Hunter/ANMM

02
With a cup of hot tea close by and sitting in front of one of the boat's heaters, Irini Malliaros notes down the details of her dive. In January 2020 the water temperature was just above 2° Celsius while the air temperature hovered around -5° Celsius. Image Kieran Hosty/ANMM



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Identification of the site hinges on the surviving hull and 'preponderance of evidence' approach

- The length between the bilge pump shaft stump and the eroded bow end of RI 2394's keel is almost identical to that recorded on the 1768 *Endeavour* plans (there is a difference of 6 inches, or 15 centimetres), and exceeds that for any of the other scuttled transports. In addition, the presence of deliberately cut holes in hull planking adjacent to the keel within the stern and midships sections indicate the vessel was deliberately scuttled.
- The respective locations of a series of three adjacent floor timbers at midships and one set of paired floor timbers in the bow section correlate exactly to the positions of *Endeavour*'s mainmast and foremast, as shown on the 1768 Admiralty plans. These groupings of floor timbers do not occur anywhere else within the recorded hull and suggest additional strengthening to support the weight and stresses generated by both masts.
- In addition to exhibiting the same size and form as that depicted on the Admiralty plans of *Endeavour*, the scarph between the keel and stem appears to be an extremely unorthodox design that has not so far been found in published literature related to 18th-century British or American shipwrecks and shipbuilding. The scarph has also not been noted on any 18th-century ship plans held in the collections of the National Maritime Museum in Greenwich, UK. Interestingly, it bears some similarity to the keel-stem scarph depicted on plans of *Marquis of Rockingham* (later HMS *Adventure*), which was constructed by Thomas Fishburn, the shipwright responsible for building the Whitby collier *Earl of Pembroke* (later HMB *Endeavour*).
- According to Australian and American timber identification specialists, the wood samples collected from RI 2394 are European species. This indicates the wreck site is that of an English or European-built ship rather than one of the American-built transports.[7] In addition, the presence of white oak in the forward end of the keel – which varies from the use of European elm in the keel elsewhere – suggests it may have been a repair. This is reinforced by the presence of a small number of rough-hewn floors between the midships and bow sections, which differ from the refined form of framing elsewhere within the hull. These possible repairs to the hull occur in the same areas where *Endeavour* was damaged when it grounded on Endeavour Reef in 1770 and later repaired in an English shipyard prior to the vessel being accepted for service as a troop transport during the American War of Independence.

Unique diagnostic artefacts – such as a ship's bell, name board, or an artefact bearing the name of a crewman, passenger or prisoner associated with *Lord Sandwich* or *Endeavour* – have not been encountered on RI 2394. However, given that *Lord Sandwich* was used as a prison hulk and later intentionally scuttled, it would have been regularly cleaned and ultimately stripped of anything of value before ending up on the bottom of Newport Harbor, and is unlikely to retain diagnostic material. This is reflected by the relative dearth of small finds encountered on the site so far. That being the case, identification of the site hinges on the surviving hull and 'preponderance of evidence' approach. Enough of the agreed criteria have now been met to identify RI 2394 as James Cook's *Endeavour* and the urgent need is now to secure the highest possible level of legislative and physical protection for the site, given its historical and cultural significance to Australia, New Zealand, the United Kingdom and the United States of America.

1 Kevin Sumption PSM, press conference attended by the Hon Paul Fletcher MP, Minister for Communications, Urban Infrastructure, Cities and the Arts, 3 February 2022.

2 J Hunter, K Hosty and I Malliaros, 'Piecing together a puzzle: Photogrammetric recording in the search for Cook's *Endeavour*', *Signals* 125, 2018, pages 14–19.

3 N Erskine, 'The *Endeavour* after James Cook: The forgotten years 1771–1778'. *The Great Circle*, vol 39, no 1, pages 55–88.

4 Ibid.

5 K Hosty and J Hunter, Archaeological identification of the shipwreck site of *Lord Sandwich*, formerly HM Bark *Endeavour*, in Newport Harbor, Rhode Island, USA. Unpublished report, Australian National Maritime Museum, Sydney, 2022.

6 Erskine, op cit, and Hosty and Hunter, ibid.

7 Kellie Michelle VanHorn. Eighteenth-century colonial American merchant ship construction. Master's thesis, Texas A&M University, 2004. Available electronically from hdl .handle .net /1969 .1 /1421.

Further reading

D K Abbass, 'Newport and Captain Cook's ships', *The Great Circle*, vol 23, no 1, pages 3–20.

M Connell and D Liddy, 'Cook's "Endeavour" Bark: did this vessel end its days in Newport, Rhode Island?', *The Great Circle*, vol 19, no 1, pages 40–49.

K Hosty and P Hundley (2001), '*Endeavour* – the quest goes on', *Signals* no 35, 2001, pages 20–26.

J Hunter, K Hosty and I Malliaros, 'Rhode Island revisited. The search for Cook's *Endeavour* continues', *Signals* 129, 2019, pages 20–26.

Acknowledgments

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