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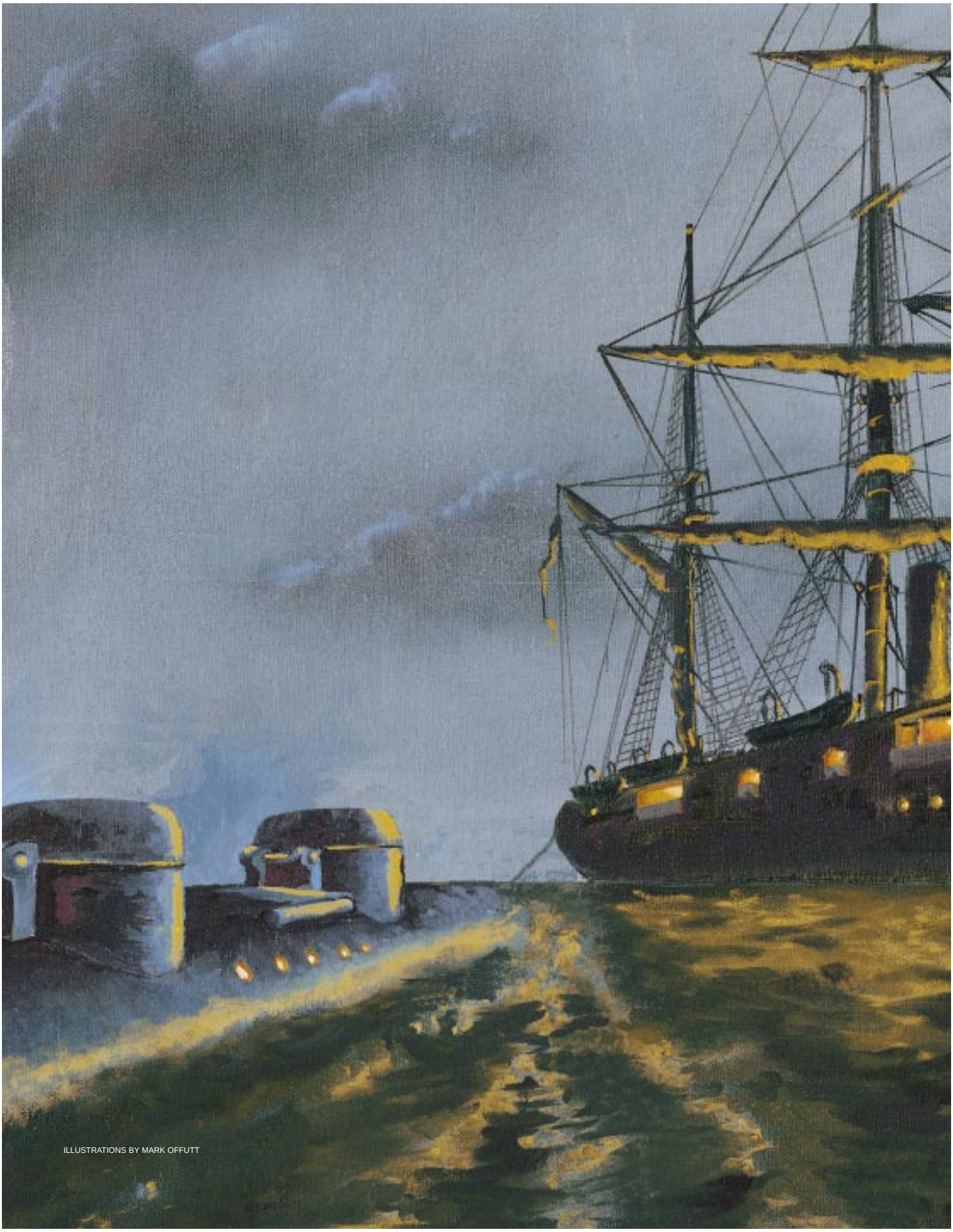

ILLUSTRATIONS BY MARK OFFUTT

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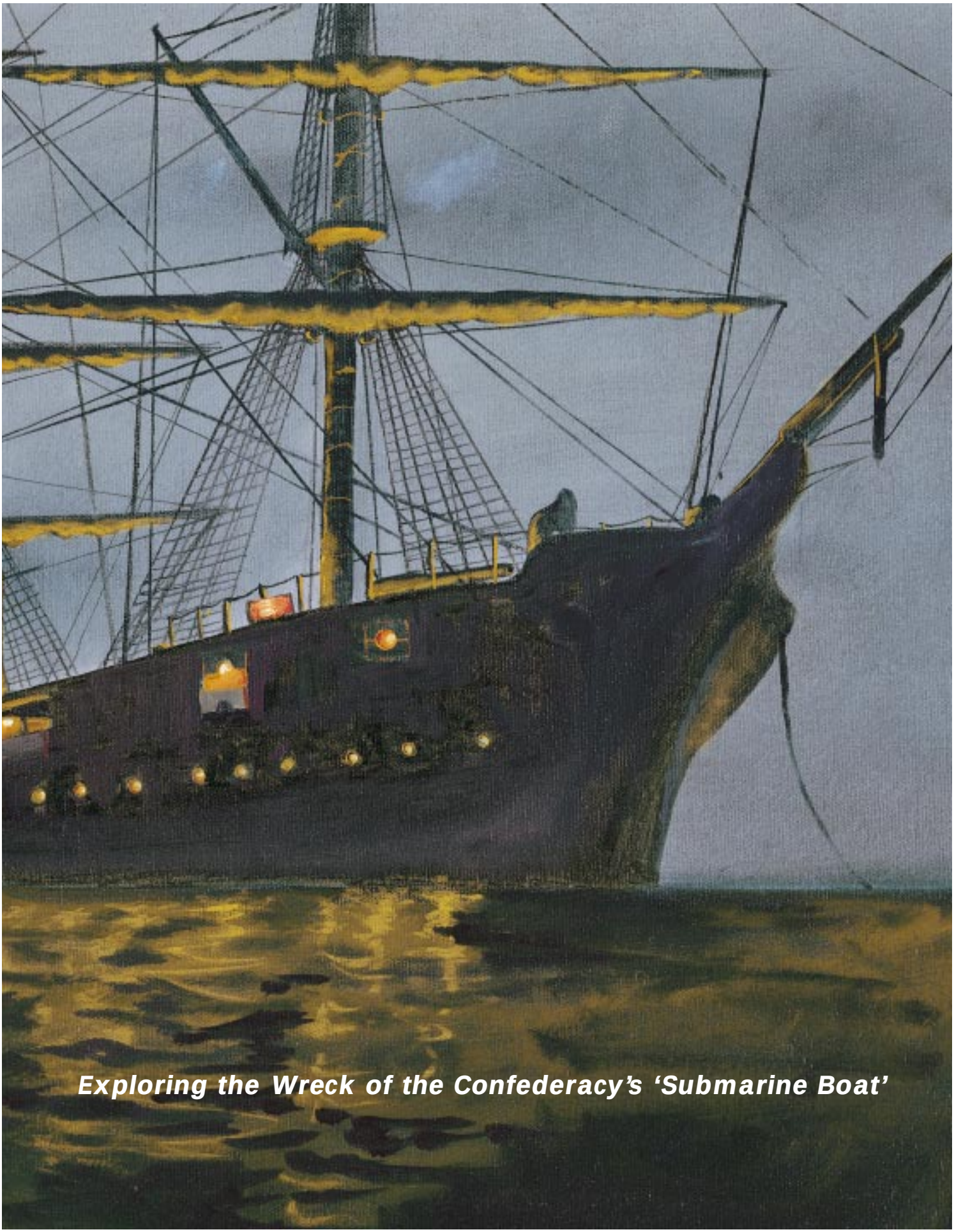
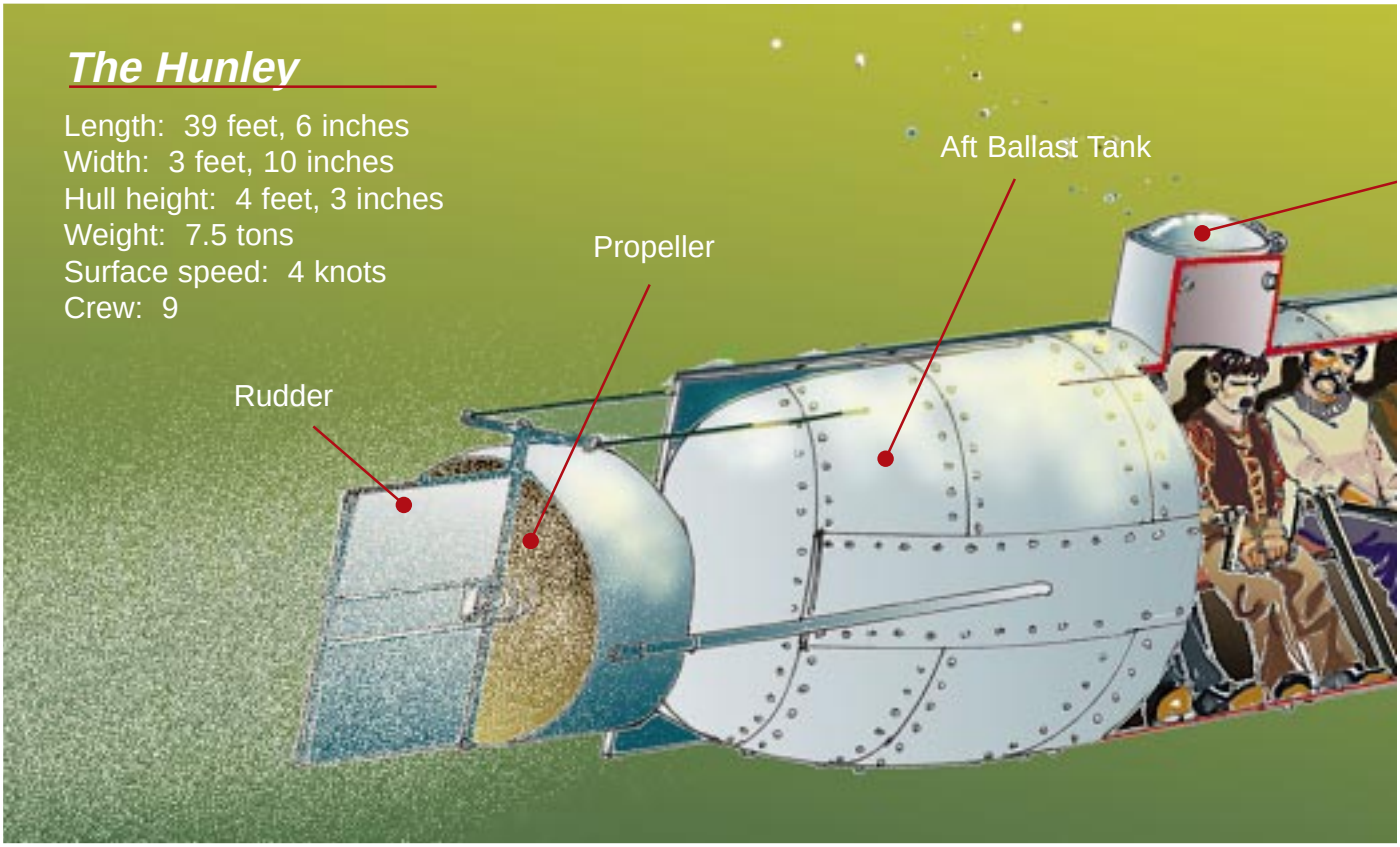


Exploring the Wreck of the Confederacy's 'Submarine Boat'

In Discovering Archaeology, Vol. 1, No. 6, 1999.

DAN DOWDEY, SOUTH CAROLINA STATE MUSEUM

A sailor on the deck of the USS Housatonic saw in the moonlight a sight that would chill the hearts of mariners for generations to come. A dark, metallic cylinder rose above the black water. It left a faint, sparkling wake as it closed on the Housatonic. The hapless sailor was the first ever to see the silent, deadly approach of an enemy submarine. Inside the H.L. Hunley that cold, February night in 1864, eight seated men rocked back and forth monotonously, working a crank that turned the little sub's screw, pushing it at perhaps 4 knots toward the kiss of immortality. Young Lt. George Dixon, standing at the forward hatch, watched the Housatonic grow larger and larger, until its wooden side filled the tiny porthole.



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Bullets pinged off the conning tower and the sub's iron hull. The ship's crew slipped the anchor and tried desperately to escape the sinister craft. Then the *Hunley* struck. Her 22-foot (6.7-meter) spar hit the *Housatonic* with a thud, embedding the harpoonlike tip below the waterline. Most of the 155 officers and men of the *Housatonic* must have felt it — and knew what it meant. The boom held 135 pounds (61 kilograms) of explosives.

The *Hunley*'s crew reversed direction and backed frantically away from their speared prey. A rope line played out from the bomb. When the rope went taut, the "torpedo" exploded.

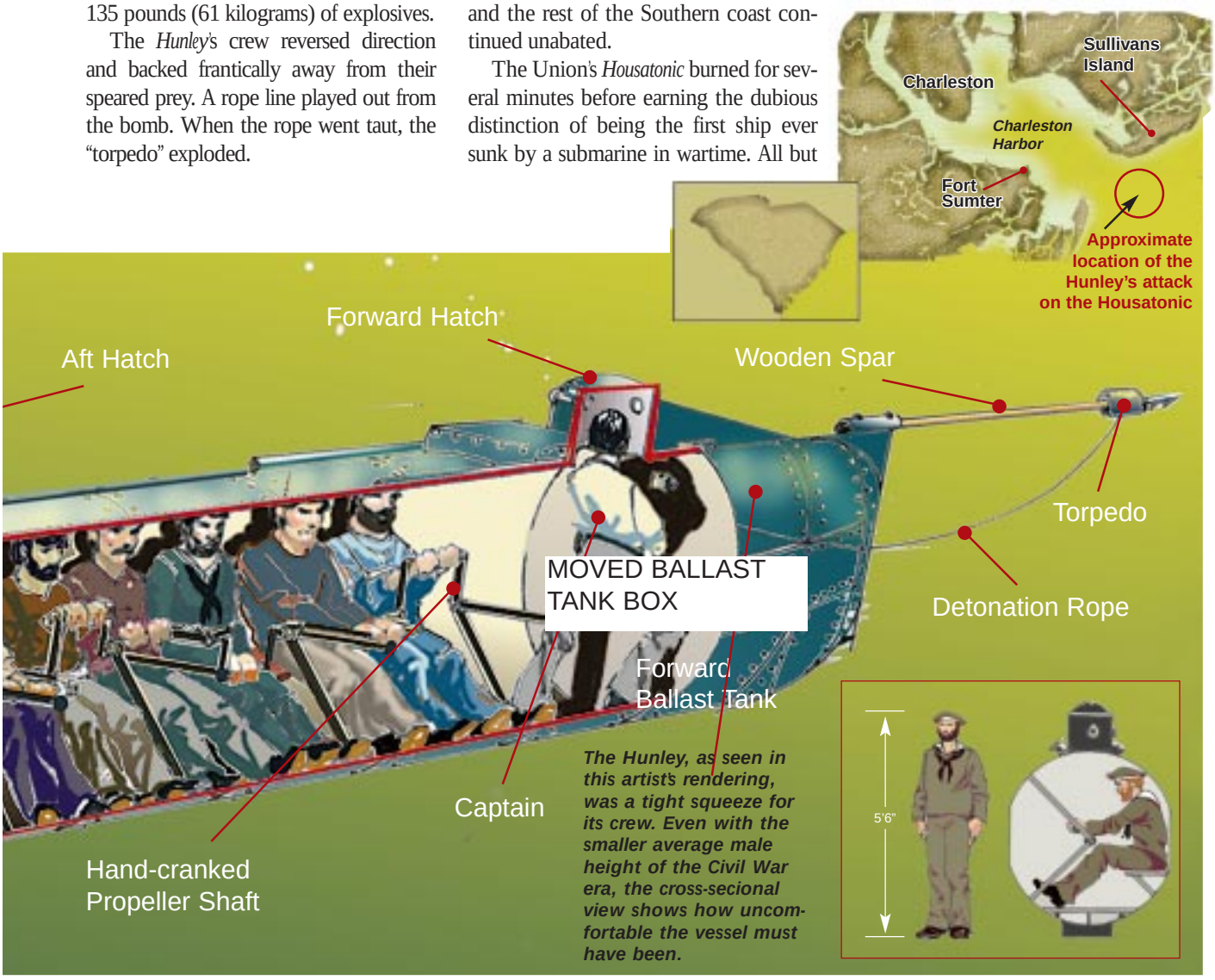
The Housatonic went to the bottom. So did the *Hunley*.

Thus ended the world's first successful combat attack by a submarine on February 17, 1864, about four miles (6.4 kilometers) off the South Carolina coast, just north of Charleston. Despite the Confederacy's high hopes, the attack had no effect on the outcome of the Civil War. The naval blockade of Charleston and the rest of the Southern coast continued unabated.

The Union's *Housatonic* burned for several minutes before earning the dubious distinction of being the first ship ever sunk by a submarine in wartime. All but five of its crew escaped.

As for the *Hunley* — well, no one really knows. Confederate lookouts on shore reported sighting the sub's blue lamp — the "mission accomplished" signal. They lit a signal fire to guide the boat in. But the *Hunley* never came home, and the mystery of its fate has lingered ever since.

The most abiding puzzle is just what



The Hunley, as seen in this artist's rendering, was a tight squeeze for its crew. Even with the smaller average male height of the Civil War era, the cross-secional view shows how uncomfortable the vessel must have been.

killed the *Hunley*. A Confederate board of inquiry concluded that the submarine survived its attack on *Housatonic*, then sank later for unknown reasons.

Among the possibilities: One of its glass ports was shot out by small-arms fire during the attack; the force of the explosion popped rivets in the hull and the sub slowly filled with water; the vessel was swamped when the hatch was opened to signal its success.

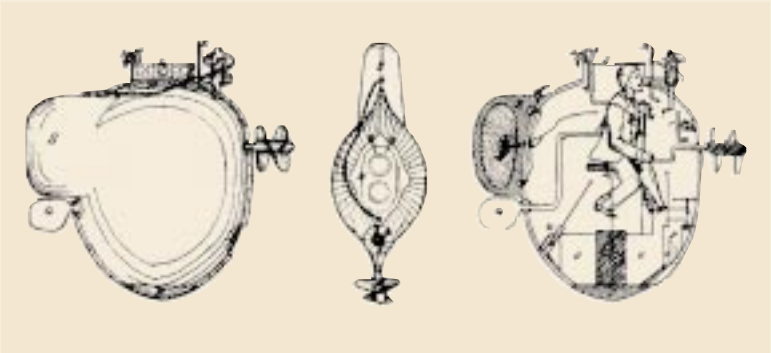
Accurate answers may be on their way. The *Hunley* has been found — intact and apparently well-preserved —under about 3 feet (one meter) of mud in 27 feet (8.2 meters) of murky water outside Charleston Harbor. Efforts to plan and finance raising the *Hunley* are under way.

From Underwater Rowboats to Invisible Attackers

The *Hunley* earned, at great price, its place in the history of submarine warfare. But the story of underwater boats begins more than two centuries earlier. The idea of invisible attackers that ambush mighty warships from beneath the waves has an undeniable allure.

In 1578, British mathematician William Bourne proposed an underwater boat that could submerge and surface by flexing and contracting the hull. Nothing like it was ever built.

But by 1624, the Dutch inventor Cornelius van Drebel actually built an underwater rowboat – a submarine covered with waterproof leather and propelled by oars mounted in watertight seals. It moved about successfully some 16 feet (five meters) beneath the surface of Britain's Thames River. Several other submarine boats were tried in the seventeenth century, but they met with mixed success.



This picture of the Revolutionary War's submarine, described by the artist as "tolerably accurate," was drawn a century after the Turtle went to war.

1875 DRAWING BY FRANCES M. BARBER / COURTESY OF BRAYTON HARRIS

The first submarine to see combat was built in Connecticut during the American Revolution. Yale University graduate David Bushnell built the *Turtle*, an oak vessel reinforced with iron bands. The one-person *Turtle* was about 7 feet, 6 inches (2.3 meters) high and shaped like an upended walnut. Its propeller was cranked by hand.

The plan was for *Turtle* to secretly move alongside the *HMS Eagle*, one of the British warships besieging New York, then use a screw device to attach a gunpowder charge to the ship's hull. The sub would retreat before a timing device set off the mine.

Turtle actually attacked the ship in history's first submarine assault. But it had to withdraw in frustration when the screw could not bore through the hull to place the charge. The potential of submarine warfare was, nonetheless, clear.

The United States tried again in the War of 1812, sending a sub described as "turtle-like" against *HMS Ramillies* off New London, Connecticut. This time the screw pierced the copper plate on the hull, only to break off before the mine was attached.

Meanwhile, Robert Fulton, who would invent the steamboat in 1807, built a submarine in 1801 in France for Napoleon. The copper-skinned *Nautilus*, which was hand-cranked, pioneered several still-used features: It put a conning tower with a glass porthole on the hull, submerged by filling its ballast tanks with water, and maneuvered with a horizontal rudder, or diving plane.

The *Nautilus*, planned as an attack submarine, didn't generate much interest in France, so Fulton took his idea to England and was just as frustrated. The steamboat worked out much better, but the history of the submarine mostly went on hold until the American Civil War. □ RL

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COURTESY OF NATIONAL PARK SERVICE

The Confederate submarine Hunley introduced design innovations still used in underwater craft. The horizontal fins (upper left corner) are precursors of modern diving planes. This replica is at the Charleston Museum.

Attempts to locate the Hunley began soon after the Civil War. Chains were dragged over the seafloor around the *Housatonic* wreckage to no effect. Showman P.T. Barnum offered $100,000 for recovery of the sub; but the money was not claimed, and the *Hunley* was never found — until May 3, 1995.

Searching for Iron

In 1980-81, the National Underwater Marine Agency (NUMA), sponsored by author Clive Cussler, received a state license to search for the *Hunley*. A NUMA vessel crisscrossed the suspected patch of Atlantic Ocean with a magnetometer — a device, widely used by seagoing archaeologists, that spots magnetic spikes (anomalies) that indicate concentrations of metal.

The team turned up a number of unsought shipwrecks over the years, but the *Hunley* eluded them. Then, in May 1995, during a joint venture with the South Carolina Institute of Archaeology and Anthropology, NUMA divers — investigating previously dismissed anomalies — found the 39-foot, 6-inch (12-meter) hull of the *Hunley*.

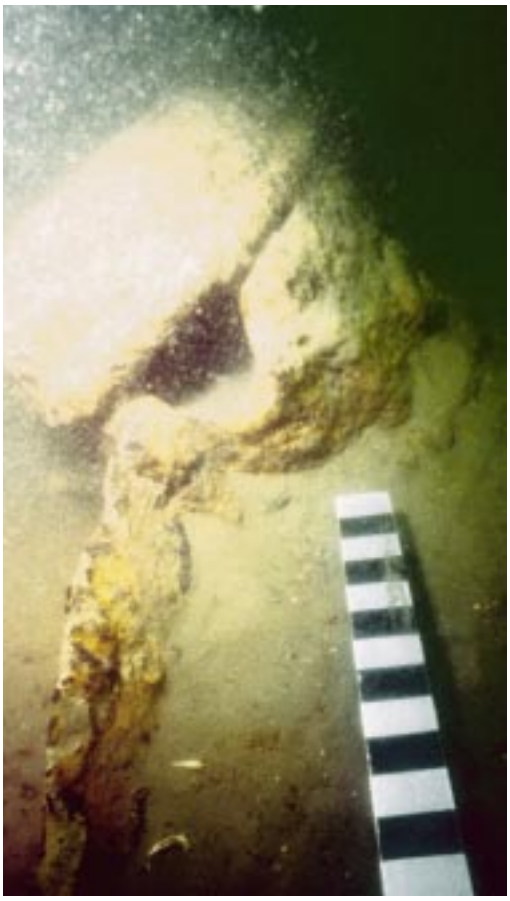
The following year, the South Carolina Hunley Commission and the Navy/Naval Historical Center launched a jointly funded, six-week survey of the *Hunley* to document the site and the condition of the hull and to evaluate the feasibility of raising the submarine.

The expedition uncovered about a third of the hull. Archaeologists found the hatches shut, the interior filled with sand and silt, and the hull encased within a sand- and shell-concretion. The sub appears to be completely intact, although with some damage to the forward hatch.

Examination on the inner workings of the submarine will have to wait until it is brought to the surface — a daunting task in itself — in 2001. And even then, removing the encrustation that covers all but the glass view ports and "deadlights" and sifting through the silt, artifacts, and human remains inside will be a lengthy and meticulous process. A score of years may pass before this maritime treasure gives up its secrets.

A Deadly Experiment

The *Hunley* was a remarkably sophisticated and well-designed craft, yet it proved it to be a death trap for every



CHRISTOPHER AMER, SOUTH CAROLINA INSTITUTE OF ARCHAEOLOGY & ANTHROPOLOGY

Divers discovered the Hunley buried under the murky waters off Charleston Harbor. This is the sub's forward conning tower, cleared of sediment.

crew that manned it. Twenty-two men died as the sub sank three times. Southern General P.G.T. Beauregard concluded: "It is more dangerous to those who use it than to the enemy."

The Third Try

The *Hunley* was the third in a series of submersibles built by Louisiana merchants Horace Hunley, James McClintock, and Baxter Wilson. The first, a clumsy-looking boat called Pioneer, was built in New Orleans in 1861. It convinced her inventors and military authorities that a surface vessel could be attacked by a craft that remained hidden beneath the waves.

The inventors scuttled that first sub as Union forces prepared to enter the city, and they fled to Mobile, Alabama. There they began work on a more-formidable submarine boat. After several failed attempts to propel their new submersible with an electric motor and a small steam engine, they installed a hand crank designed to be turned by four men.

But this American Diver sank in February 1863, while being towed in stormy seas near the mouth of Mobile Bay. Then the inventors teamed with a group of Southern engineers with close ties to the Confederacy's Secret Service.

A third submarine boat, designed for a crew of nine and christened the *H.L. Hunley*, was completed in July 1863, and sent to Charleston, which was under bombardment by blockading Union ships. The *Hunley* sank twice on test-and-training dives, killing 13 crewmen (including Hunley). Both mishaps were

Excavations Uncover Remains of a Sunken Union Warship

The years have not been kind to the *USS Housatonic*. The Union sloop of war ended the Civil War on the bottom of the Atlantic, with five of her crew, off the coast of South Carolina – the first ship ever sunk in combat by a submarine.

A decade later, its battered hull was deemed a hazard to navigation and was blown apart. The U.S. Army Corps of Engineers blasted the shattered remnants again in 1909 to clear a path for shipping. What's left is a challenge for undersea archaeologists, who began excavating the martyred ship this past summer.

All that remains of the 1,240-pound (563-kilogram) steam sloop is buried under more than 5 feet (1.5 meters) of sand, shell, and mud; but uncovering the debris could shed new light on the brief, historic engagement of February 17, 1864, and could lead to a richer appreciation of life on the Union blockade during the War Between the States.

After being torpedoed by the Confederate submarine *H.L. Hunley*, *Housatonic* sank in less than five minutes, its stern virtually blown away by the 135-pound (61-kilogram) charge. Moments later the *Hunley* itself sank, presumably with all hands.

USS Housatonic, a 207-foot-long (63-meter-long) warship built in a record 90 days, was launched at Boston, Massachusetts, on November 20, 1861. It was heavily armed with 12 big guns, including a 100-pounder, Parrot rifled cannon. After a brief and varied career, *Housatonic* joined Admiral Dalgren's blockade of Charleston, South Carolina.

Few details are known about the *Housatonic*, but plans exist of its sister ship, *USS Ossippee*. Archaeologists used these plans to locate the three test excavations on the buried wreckage – one near the bow of the ship and the other two slightly forward of the stern, where blast damage from *Hunley's* torpedo was concentrated.

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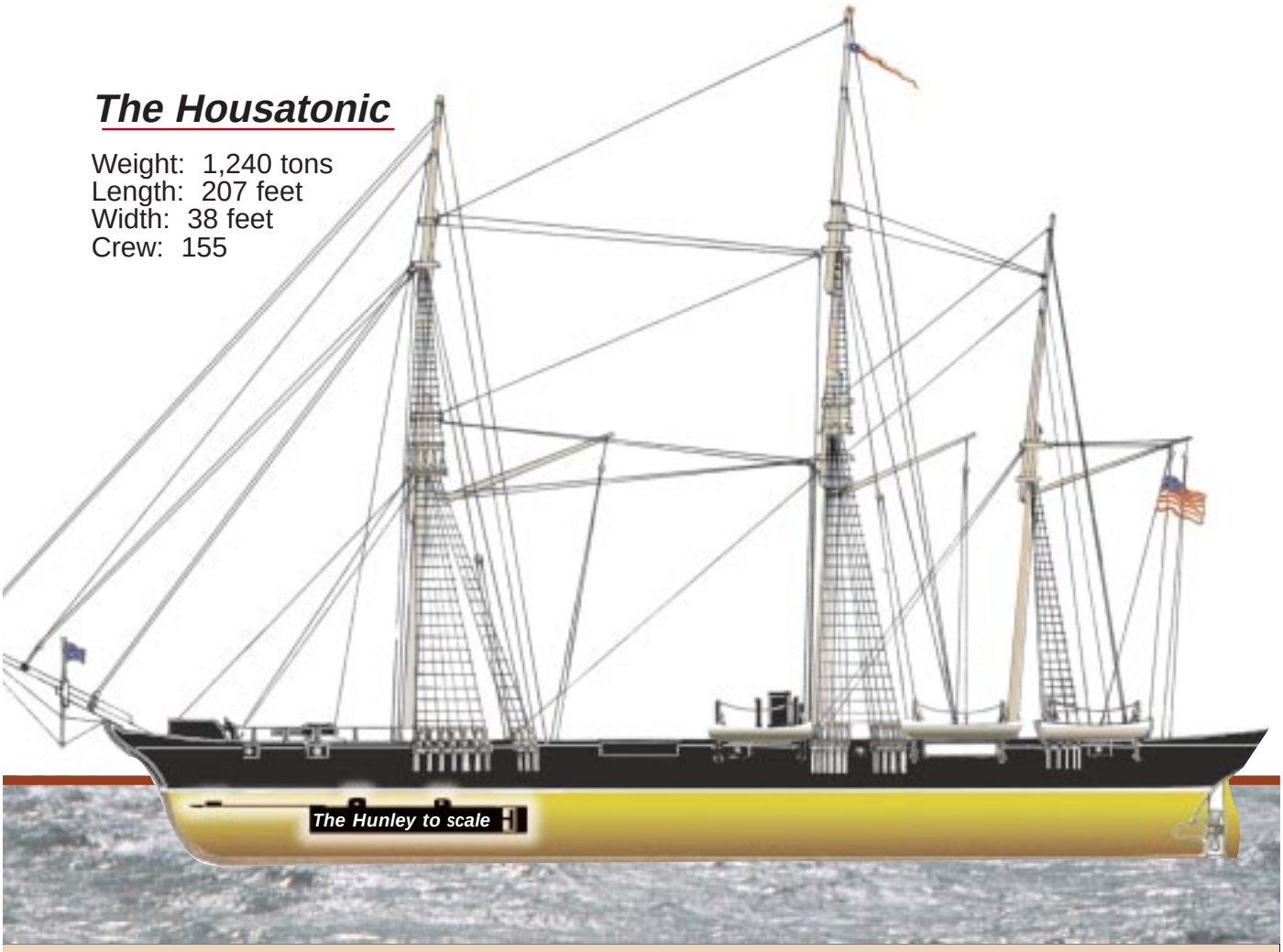
The Housatonic

Weight: 1,240 tons
Length: 207 feet
Width: 38 feet
Crew: 155



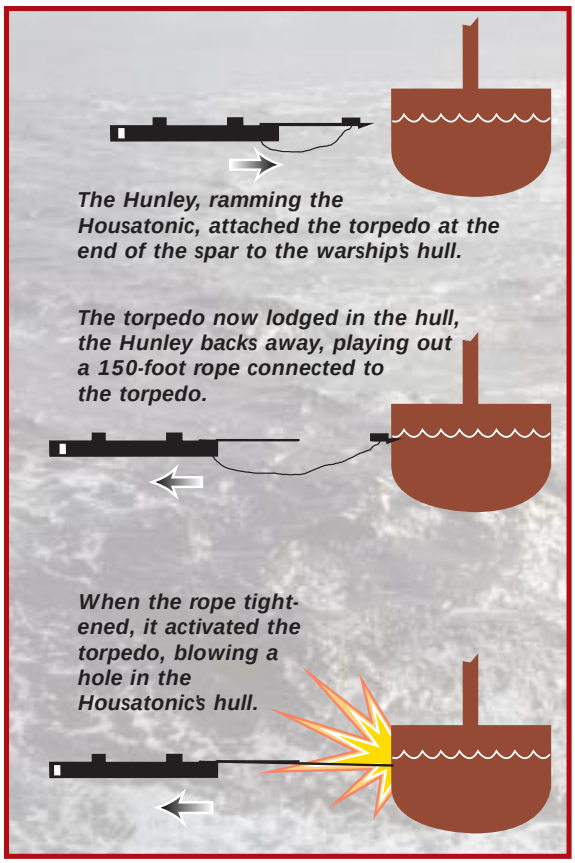
The excavation was conducted by archaeologists from the Naval Historical Center's Underwater Archaeology Branch and the South Carolina Institute of Archaeology and Anthropology's Underwater Archaeology Division, with assistance from the National Park Service's Submerged Cultural Resource Unit and the South Carolina Department of Natural Resources' Marine Resources Division.

In the bow, we located two of the ship's water tanks, which helped determine that the ship was pointed northwest at the time of sinking. From this area, we recovered personal effects of the crew, including six boots and a wood-and-lead pencil. The crew's quarters were located directly above the water tanks, and their personal effects probably settled in the hull as, over time, the upper decks collapsed.

Among the scattered wreckage, we found a host of artifacts that attest to the events on that cold, February night 135 years ago. Leather shoes remind us of the terror and confusion of those last moments as the ship settled to the seafloor, and the crew, some of them half naked, took to the rigging or were washed overboard.

We found ordnance fuses and a pistol from the ship's armaments; copper drift pins, once used to hold the wooden hull together and now twisted into pretzel-like shapes by the blasts; and large quantities of coal for the steam boilers in all three test trenches we excavated. Also recovered was a wrecking bar that may have been used by divers to pry apart the blasted metal during the 1870 or 1909 demolitions.

The 1999 survey of the stricken vessel gave archaeologists an opportunity to confirm that an extensive amount of this historically significant warship still exists. Excavating and interpreting the remains will help us complete the story of that February night, 1864, when submarine warfare began. □ CA



blamed on human error, however; and the sub was salvaged, repaired, and sent back to sea with a new volunteer crew.

The boat was built of a steam boiler cut lengthwise and widened, then fitted with rounded sections fore and aft. Two conning towers were added near each end. The propeller was cranked by eight men and controlled by a horizontal rudder, a device now called a dive plane. The *Hunley* submerged by filling ballast tanks fore and aft with water; it surfaced by pumping out the water.

Running Out of Air

The sub had no source of fresh air when submerged. Its crew simply breathed the air trapped in the watertight hull and surfaced when they used it up. The boat could run submerged for more than two hours.

Despite written records describing this unique secret weapon, surprisingly little is actually known about the boat itself, which, after all, may have been under the control of the Secret Service. Historical descriptions and illustrations differ in reporting the shape and dimensions of the submarine, and even the preliminary archaeological research contradicts contemporary accounts. Accurate details must await examination of the hull and interior.

So far, we know the submarine is longer than previously thought: 39 feet, 6 inches (12 meters) from bow to stern, excluding the rudder and propeller, which might add another 4 feet (1.2 meters). And the boat is only 3 feet, 10 inches (1.17 meters) wide and 4 feet, 3 inches (1.3 meters) from the top of the hull to the bottom of the keel, not the 5 feet (1.5 meters) seen in historical records.

Today, plans are in full swing to bring up this historic boat by the year 2001 for scholars to study and the public to appreciate. The South Carolina Hunley Commission has set up a not-for-profit organization called "Friends of the *Hunley*" to raise some $17 million to retrieve the boat, conserve it, and display the completed hull in an appropriate exhibition. All this will take place in Charleston, where the *Hunley* operated and was lost.

The U.S. Navy and South Carolina agreed in 1996 that the *Hunley* will remain the property of the federal government, but will be kept in South Carolina, which will have custody in perpetuity.

And what of the *Hunley*'s crew? Researchers expect to find the remains of the last crew still entombed within the hull. The remains of four members of the first lost crew were recently found in a common grave beneath the Citadel military college in Charleston, while the bodies of the second crew lie buried in Magnolia Cemetery, just north of Charleston. Eventually, all three crews will be interred at Magnolia with full military honors, reunited in death.

The War Between the States was a proving ground for improvement in a wide variety of weaponry — rifled guns, naval armor, and mine technology, to name a few. Many of the achievements of the industrial and scientific revolution were applied on a large scale to the fields of conflict.

The submarine, particularly *H.L. Hunley*, was arguably the most dramatic naval weapon introduced during the conflict. Scholars are only now beginning to understand the depth of submarine research being conducted by both the North and South throughout this tumultuous period. And the *Hunley*'s place in that history is secure as the first submarine to succeed at its grim task: sinking an enemy ship in combat. □

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MARK K. RAGAN is an archaeologist and computer programmer in Maryland. He has written several books on the H.L. Hunley and continues to research early underwater technology. He also runs a submarine piloting school.

Further reading

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