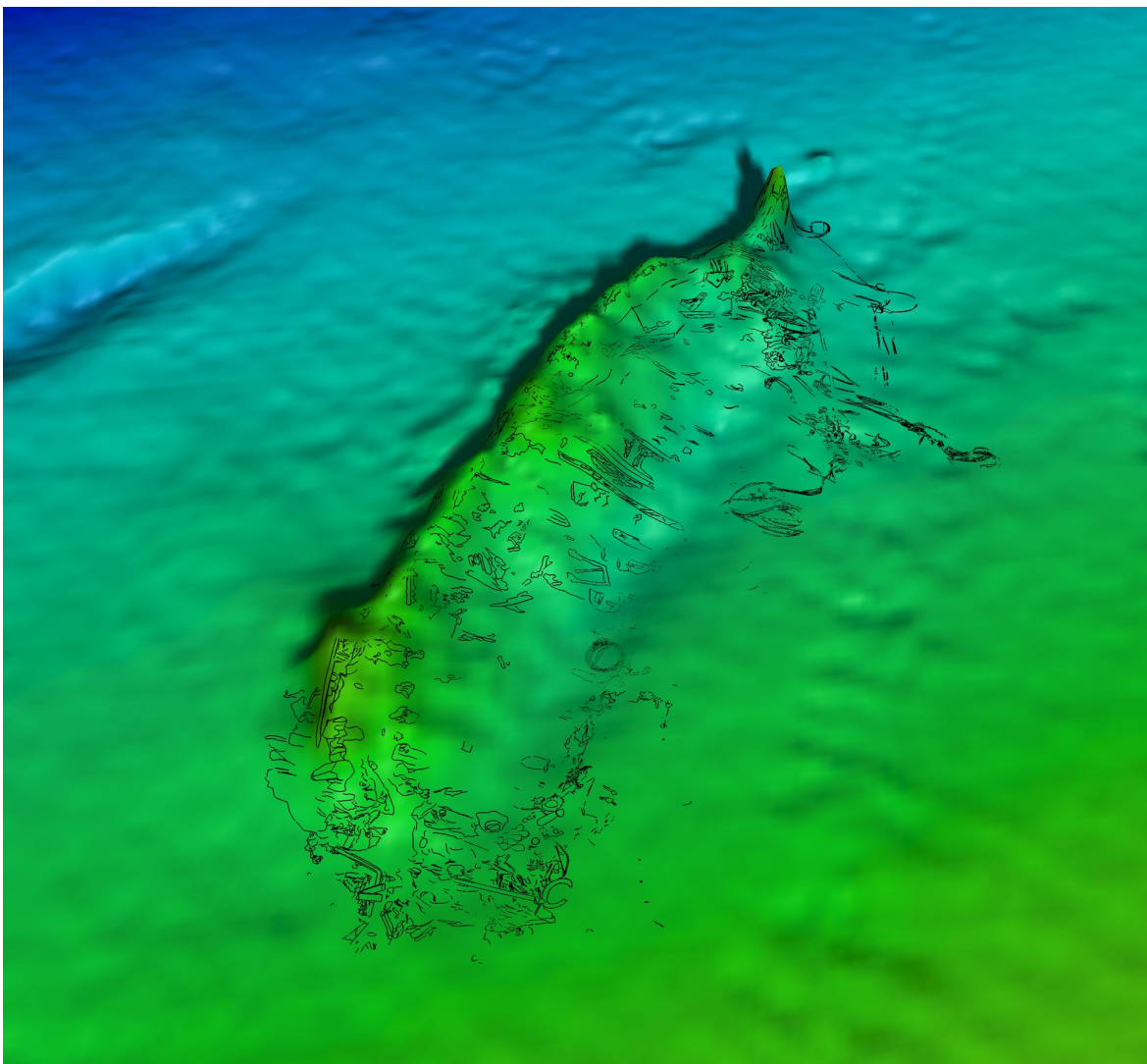




Viosca Knoll Wreck

Discovery and Investigation of an Early Nineteenth-Century Wooden Sailing Vessel in 2,000 Feet of Water



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ABOUT THE COVER

The cover art is by Robert A. Church and was produced by draping the site plan over *C-Surveyor-I*TM AUV multibeam data processed by Donny Fontenot of C & C Technologies, Inc.

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Introduction

A 2003 deep-tow survey for a pipeline in the Viosca Knoll lease area of the Gulf of Mexico detected a shipwreck near the proposed pipeline project area. Discovered on a line turn, the shipwreck rests in 2,000 feet of water outside of the pipeline corridor. Initial indications from the high-resolution geophysical data suggested the wreck might be *Bradford C. French*, a late nineteenth-century three-masted schooner lost during a 1916 hurricane. A site investigation was planned during the 2004 Minerals Management Service (MMS) DeepWrecks Project, but adverse weather made investigating the site impossible at that time (Church et al. 2007). The MMS later sponsored a site investigation in July 2006. The site was visually inspected with a Remotely Operated Vehicle (ROV) under the direction of C & C Technologies (C & C) marine archaeologist Robert Church and MMS marine archaeologists Jack Irion and David Ball. The findings of the ROV investigation suggest the wreck is not a three-masted late nineteenth-century schooner, but possibly an early nineteenth-century brig. This report discusses the findings from the ROV investigation and the preliminary site survey.

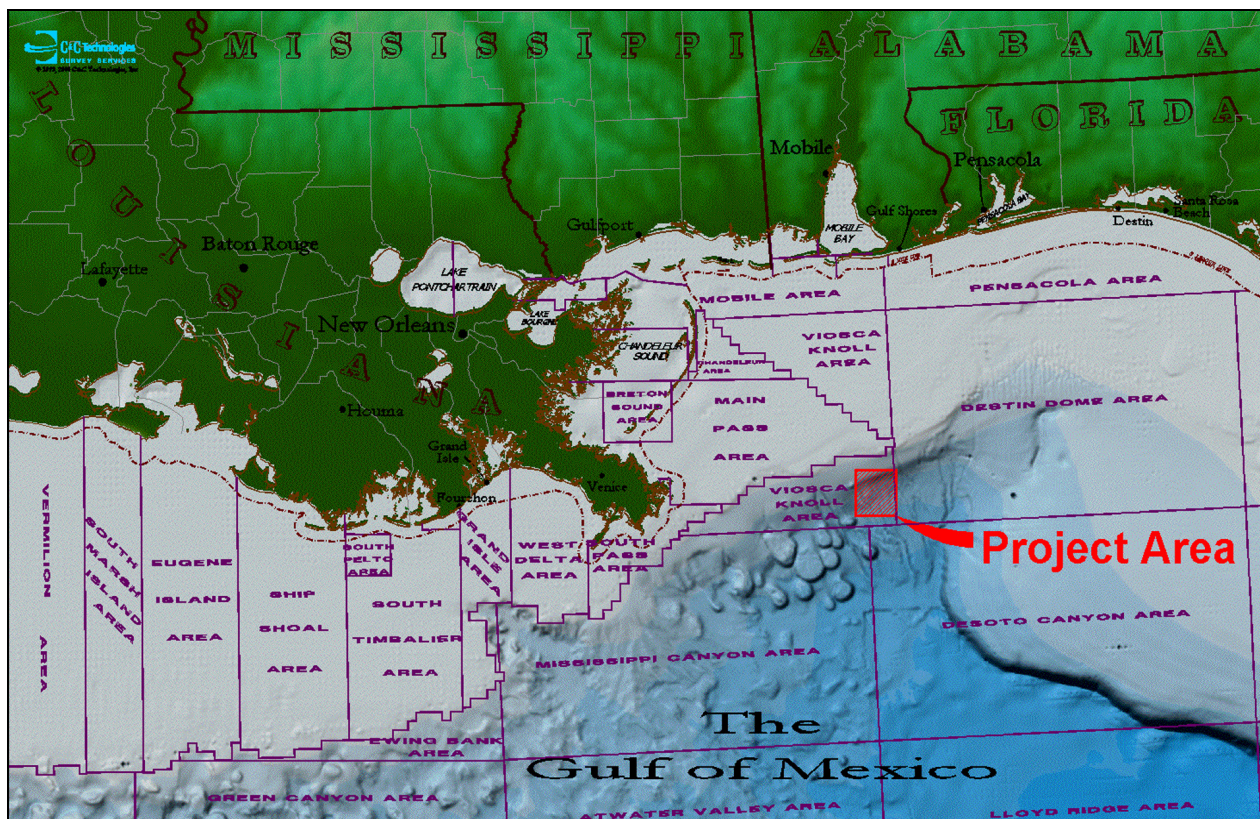


Figure 1. Project area map.

Project Area and Geographical Setting

The survey area is located in the eastern portion of the Viosca Knoll Area of the Gulf of Mexico (Figure 1). The regional geology in this area is part of the northeastern Mississippi fan (upper fan), which is defined as a channel-levee-overbank system (Bouma et al. 1985). The Mississippi fan is a submarine fan in the deepwater region of the northeastern Gulf of Mexico. During the Middle Miocene, a pronounced eastward migration of the ancestral Mississippi River depocenter occurred depositing progradational sediments east of the present-day Mississippi River delta. Submarine fan deposition extended into the South Pass and the Viosca Knoll Areas during this epoch. During the Upper Pliocene, the sediment depocenter in the Viosca Knoll Area migrated towards a westward basin. Submarine fan facies expanded into deeper water, covering a wide area from Garden Banks to Viosca Knoll (Hunt and Burgess 1995; and Lee and George 2002).

Northern Gulf of Mexico 1760s-1820s

The northern coast of the Gulf of Mexico has a long history of maritime activity. The Spanish were exploring the northern Gulf coast in the early sixteenth century. In the two hundred years that followed, the French and English also pursued interests along the Gulf. By the 1760s, the Spanish, French, and British all claimed land holdings along the northern Gulf coast, each seeking to carve out a new world empire on which to establish new commerce and power. Vital ports, such as Pensacola, Mobile, and New Orleans changed hands periodically through the politically volatile eighteenth century. In 1762, the French ceded control of the vast region known as Louisiana to Spain. The boundaries of Louisiana far exceeded the modern boundaries of the State of Louisiana, but no one at the time knew the full extent of the inland territory. As Spain's interests in the Gulf increased, Spanish vessels became more numerous along the coast and trade routes became well established (Figure 2). Raw materials such as timber, naval stores, indigo, hides, rice, sugar, and cattle were exported out of the new world colonies, while manufactured products consisting of hardware, machinery, or various household items were imported (Pearson et al. 1989; and Tindall 1988).

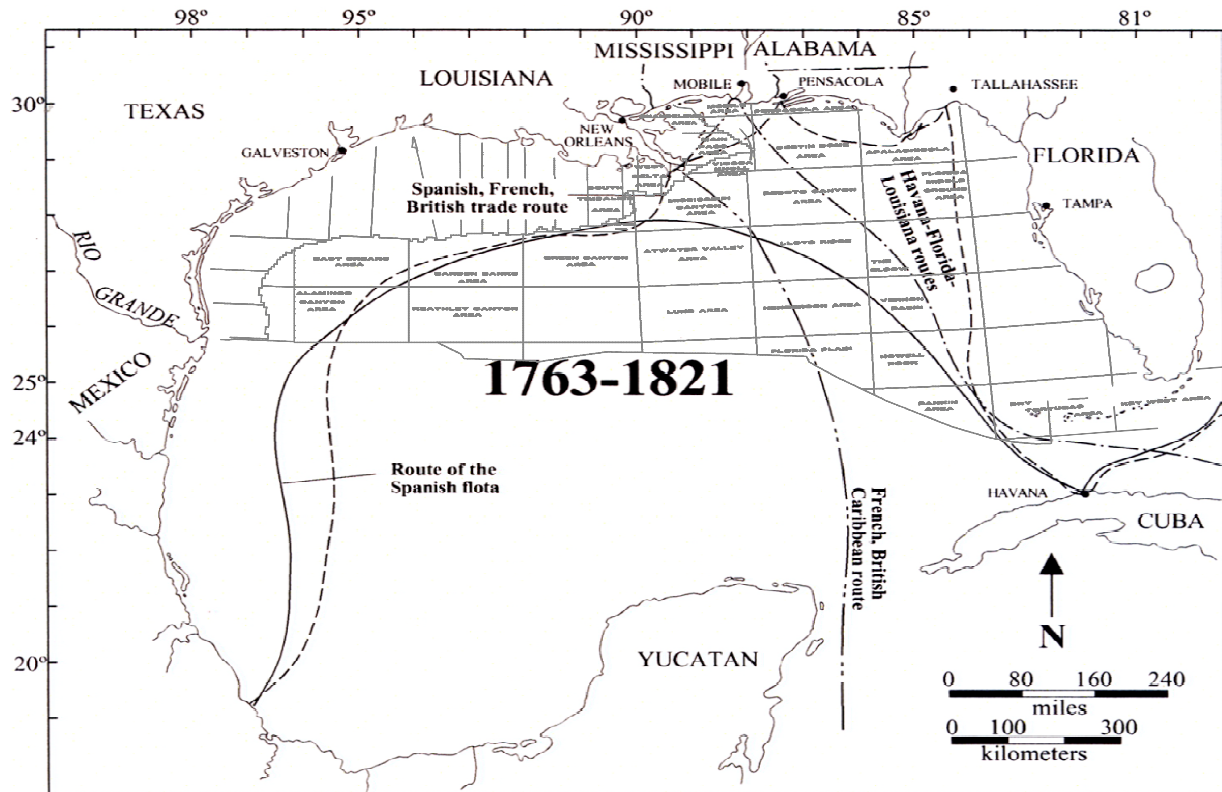


Figure 2. Traditional shipping routes in the Gulf of Mexico, 1763-1821 (modified from Pearson et al. 2003).

A general state of political turmoil ensued in North America during the last quarter of the eighteenth century. The British colonies along the Atlantic Coast were becoming increasingly dissatisfied with the crown. This civil unrest soon intensified into rebellion, which would soon affect the Gulf coast as well. On July 4, 1776, the Continental Congress adopted Thomas Jefferson's Declaration of Independence. The revolution that followed soon escalated into a global affair. In 1778, the French allied with the Americans and the following year, Spain allied with France. Britain, at war with the Americans, French, and Spanish, also declared war on the Dutch in 1780 for trading with its enemies (Tindall 1988). At the close of the war in 1783, control of North America was divided by Spain, France, Britain, and the newly formed United States of America. The expansion of American settlements in Kentucky, Tennessee, and the Ohio valley brought an increase in American commerce to the Mississippi River Valley. American goods began to travel down the Mississippi River for export through Spanish controlled New Orleans. In 1784, the Spanish closed the lower Mississippi River to all but Spanish trade, sparking angry reaction from Americans up river. Diplomacy reopened the port

of New Orleans to American commerce in 1795, but the incident had strained American and Spanish relations in the area (Bradshaw 2002).

At the beginning of the nineteenth century, the Gulf of Mexico was an arena of commerce, political unrest, and piracy, each one intertwined with the other. In 1800, newly elected President Thomas Jefferson appointed Robert Livingston as the United States' minister to Spain. Jefferson immediately sent him to purchase the city of New Orleans and the surrounding area from the Spanish Crown. After his arrival in Spain, Livingston discovered Spain had secretly traded the Louisiana territory to Napoleon Bonaparte of France. Thomas Jefferson feared French control of the Mississippi River would cause serious trouble for American shipping in the Gulf of Mexico. Jefferson, therefore, dispatched Livingston and James Monroe to Paris in 1803 to negotiate the sale of New Orleans to the United States. Napoleon was initially unreceptive to the offer. He was, however, at war with Britain and became apprehensive that Britain, already with a naval presence in the Gulf of Mexico, would take Louisiana from him before he could secure the region. Eventually, Napoleon's apprehension over the ongoing war with Britain and the need of money to finance the war led him to make a surprising offer. Instead of just New Orleans, Napoleon offered up the entire Louisiana Territory to Livingston and Monroe. Although authorized only to buy New Orleans, Livingston and Monroe returned home having negotiated the purchase of the entire Louisiana Territory, which nearly doubled the size of the United States (Bradshaw 2002; and Tindall 1988).

During negotiations for the purchase of the Louisiana Territories, the territorial boundaries were only vaguely defined. When Livingston asked the French foreign minister about the boundaries, the minister replied that Livingston had "made a noble bargain" and America would no doubt "make the most of it." The vague boundaries gave the United States a strong claim to parts of Texas and Florida in addition to Louisiana. The Spanish were furious when the sale was made public, claiming that Napoleon had no right to agree to sell the territory before he actually took possession of it. By 1806, clashes between Spain and America over disputed territory led to a lawless no-mans-land for several miles east of the Sabine River that became a haven for thieves, smugglers, and pirates. (Tindall 1988; and Bradshaw 2002).

The first two decades of the nineteenth century were a heyday for privateering, piracy, and other illicit activities in the Caribbean and the Gulf of Mexico as the war between France and Britain wore on and Spanish influence in the new world waned. During this period warring countries bolstered their sea power by issuing *Letters of Marque* to private men-of-war to attack enemy ships for profit. The value of these captured ships, referred to as prizes, was to be split between the privateer and the government. In the words of author William C. Davis, “The English preyed on the French, the French upon the English, and everyone went after the Spaniards’ vessels.” The line between privateering and piracy was often blurred as many privateers also engaged in smuggling and were, at times, indiscriminate in their attacks on merchant shipping. In 1803, the United States outlawed the importation of foreign slaves, making slave smuggling a profitable enterprise and Spanish slave ships attractive targets for privateers and pirates. The high demand for cotton production spurred on the slave trade and the availability of new land allowed cotton and sugarcane plantations to boom in the Louisiana Territory. The market for slave labor continued to rise and New Orleans was the doorway for this commerce, legal and illegal alike (Davis 2005; and Bradshaw 2002).

Pierre Laffite was one of thousands of French refugees fleeing the slave revolt in San Domingue. By 1803, he was in Louisiana scraping by as a merchant between New Orleans and Spanish held Baton Rouge. In 1805, Pierre was wanted for debt charges in New Orleans. At about this time, Captain Laffite of the privateer, *La Soeur Cherie*, arrived in New Orleans. A number of captains named Laffite, by various spellings, were sailing the Gulf at this time and it is not known if this was Pierre’s younger brother, the infamous Jean Laffite. *La Soeur Cherie* departed New Orleans just before the ship could be searched, which happened to coincide with Pierre Laffite’s disappearance from the city. Early in 1806, Pierre, nearly penniless the previous year, was back in New Orleans with marketable slaves for sale. Turning a handy profit from the slave sale, Pierre embarked on a career as merchant and slave smuggler along the Gulf Coast (Davis 2005).

Pierre Laffite and later his brother, Jean, found the Louisiana Gulf Coast ideal for smuggling operations, especially the area around Barataria Bay southwest of New Orleans. Barataria Bay provided a safe haven for entrepreneurs willing to operate outside the constraints of the law. The Bay is protected by two low barrier islands, Grand Terre and Grand Isle. It is accessible from the

Gulf by a single pass that is difficult to navigate. Several bayous and lakes connect the Bay to points just below New Orleans and to Bayou Lafourche, which led directly to the Mississippi River between New Orleans and Baton Rouge. These interconnected waterways offered a back door for smuggling goods and slaves around the customs agents in New Orleans and the customs station at the Belize near the mouth of the Mississippi River. By 1809, the French privateer, Jean Laffite, was operating out of Baratavia. He was one of numerous privateers or pirates operating out of the inlets and bays along the Gulf Coast. It was not long before the Laffite brothers had a lucrative smuggling enterprise, with Jean handling the exchange of slaves at Grand Terre, while Pierre conducted the business affairs in New Orleans. Although despised by Territorial Governor Claiborne for their illicit activities, the charismatic Laffites quickly became quite influential and powerful among the predominantly French population of southern Louisiana. Soon the Laffites would find themselves caught between patriotism and self-preservation in a war between the United States and Britain that loomed in the years ahead (Davis 2005).



Figure 3. North-central Gulf Coast in 1806.

On April 30, 1812, barely a month after Louisiana became a state, the United States declared war on England in response to the British practice of illegally impressing American sailors into the Royal Navy. The Gulf Coast was ill prepared for the war and the impending British invasion. The British offered Jean Laffite an Officer's commission to aid in the assault on Louisiana, but

he declined, knowing that a British victory meant the end of his private enterprise. He instead offered his services to the American Government in exchange for a pardon. His offer was considered by the Governor, but rejected, as plans were already underway to disperse the Baratarians. By 1814, the war was going poorly for America. Although General Andrew Jackson regarded Laffite and the other Baratarians as no better than scoundrels, Jackson finally relented to using them in exchange for clemency and his recommendation of pardon. More importantly, Jackson wanted the 7,500 gunflints and other provisions the Laffites had stored away to help to augment his meager supplies for the anticipated battle with the British Army (Bradshaw 2002; Davis 2005).

In December 1814, British forces invaded the Lower Mississippi Valley, entering Lake Borgne to the east of New Orleans. The British arrived with a fleet of fifty naval vessels including several 74-gun ships of the line. These included *Tonnant*, *Ramillies*, and *Royal Oak* along with various frigates, brigs, and armed transports. The Americans met the opposing force with a small defensive navy composed of the 22-gun sloop *Louisiana*, the 14-gun schooner *Carolina*, several lightly armed gunboats, and a few other small vessels. The Americans lost the majority of their gunboat flotilla near Lake Borgne and the British destroyed *Carolina* in the Mississippi River south of New Orleans (Eller et al. 1965; Dudley 1992). Despite heavy naval losses, Jackson's forces, comprised of mostly militia, repelled the British Army's advance on New Orleans. Although the Baratarians made up only a small percentage of the defending force, they proved their worth during the attack and received high praise in the national press. A peace treaty was signed in Belgium on December 24, 1814, the month before the Battle of New Orleans took place. The war with England was over, as was the organized smuggling operation at Baratavia Bay (Davis 2005).

For their help in defeating the British invasion, the Laffites and the other Baratarians who participated in the war were granted full pardons. The Laffite brothers walked the streets of New Orleans as free men for just over a year after the war, but were apparently unsatisfied with honest living and soon returned to their former trade. Spain was struggling to maintain control of its Mexico Territory under the threat of a revolt. The Laffites relocated their operation to the privateering community at Galveston Island and renewed their smuggling operation along with

many former Baratarians. By 1820, the United States, serious about ridding the Gulf of piracy, used military force to drive the pirates out of Galveston just before Mexico won its independence from Spain (Davis 2005).

After being expelled from Galveston Island, the Laffites relocated their base to the Yucatan where they possibly hoped to operate as privateers under the Mexican flag, but this venture was short-lived. In 1821, Pierre Laffite died of illness while pirating in the Caribbean. The death of Jean Laffite followed two years later from wounds sustained during an exchange of cannon fire with a brig and schooner he mistakenly thought were Spanish merchantmen. Soon after their deaths political stability within the region closed the door on large-scale piracy in the Gulf of Mexico, paving the way for more stable commercial trade (Davis 2005).

Vessel Types

Between 1770 and 1830 ships, barques, sloops, schooners, brigs, and brigantines among other types commonly sailed the Gulf of Mexico. The ship rig applies to the largest class of sailing vessel containing at least three masts, square-rigged on each mast, and having a bowsprit. Barques were similarly rigged to ships, but have only fore-and-aft sails on the mizzenmast. Ships and barques were generally employed as merchantmen for transoceanic voyages (Annual 1886; and Swanson 1991).

Sloops were quite common globally and one of the oldest styles of vessels utilized for trade in the Americas. They were small vessels, often less than 50 feet in length. They carried a single mast with a bowsprit and rigged with fore-and-aft mainsail, and jib or foresail. Sloops could sail close to the wind and were highly maneuverable in narrow waters. Their seaworthiness and sailing characteristics made them popular vessels to both merchants and privateers (Annual 1886; and Swanson 1991).

The fore-and-aft rig was prominent in the Caribbean and over the course of the eighteenth century adopted into shipbuilding in North America. The brig, brigantine, and schooner are examples of the impact of the Caribbean Bermuda-rig (Smith 2007). Small coastal schooners were introduced in American waters during the early eighteenth century. Schooners are typically

two-masted fore-and-aft rigged vessels often with light square topsails. They are fast and relatively easy to handle. The early coastal schooners were typically 20 to 90 tons and 50 to 90 feet in length. By the late nineteenth century, larger schooners of over 300 tons and greater than 100 feet in length became common. These larger vessels often carried more than two masts (Swanson 1991; and Annual 1886).

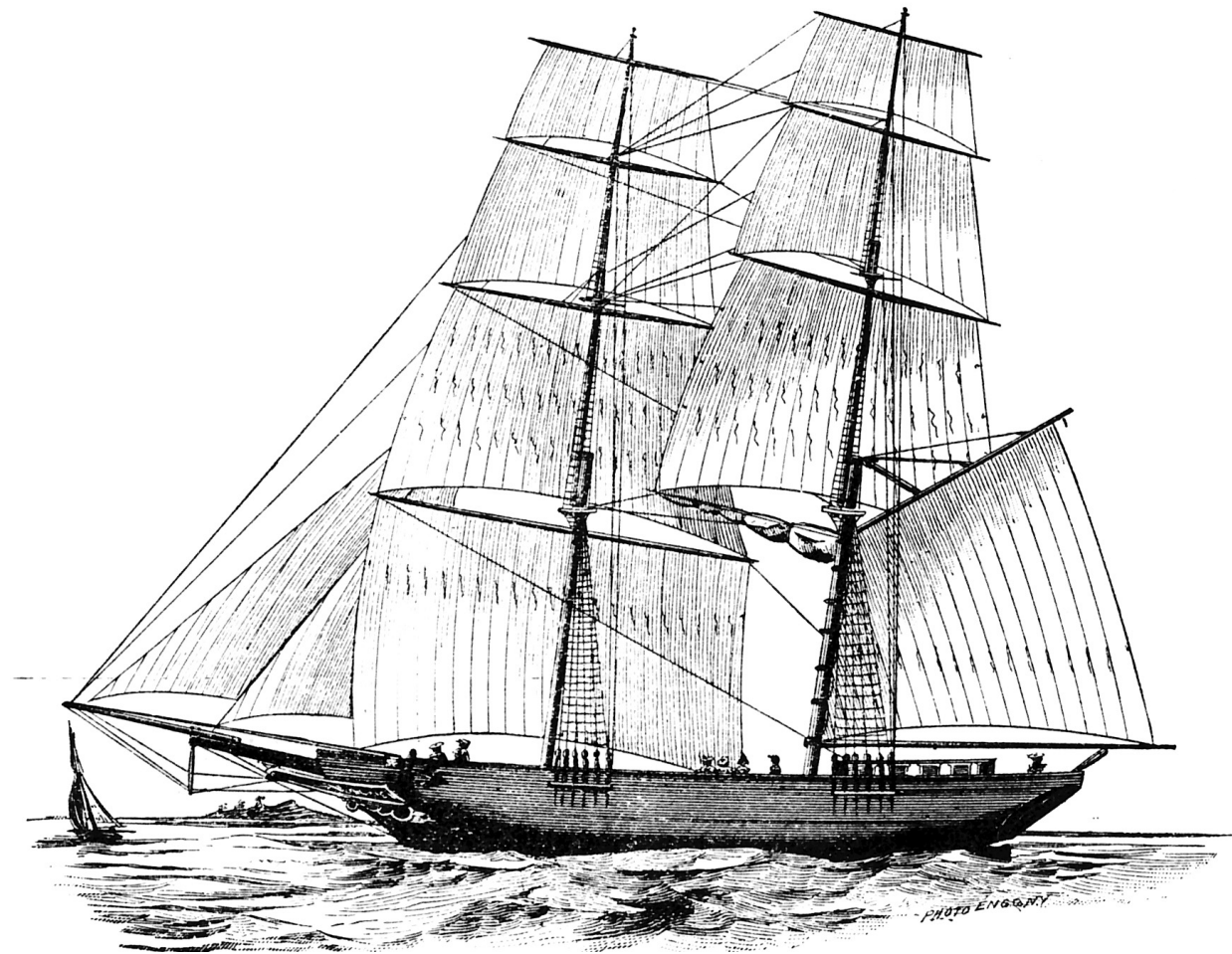


Figure 4. Typical nineteenth-century brig (Annual 1886).

Brigs and brigantines were popular vessels for coastal trade by the last quarter of the eighteenth-century. The terms are often used synonymously in historical documents, but the rig and period of introduction are slightly different. Brigs, common in the Americas by the mid eighteenth century, are two-masted, square-rigged vessels with a fore-and-aft sail (or gaff) on the main mast, which aided maneuverability. Brigantines are a later adaptation of the brig. They have a brig foremast, but a main mast similar to a schooner except they carry a light topsail on the main

mast. It is impossible to tell the difference between the two archaeologically unless the masts and sparring are present. Brigs/brigantines could take advantage of light winds and easily navigate coastal waters. Their intermediate size, approximately 100 to 130 feet in length, and rig versatility made them well suited for the coasting trade (Smith 2005; Annual 1886).

Sheathing

Adding to the hazards of tropical weather and political instability, the warm waters of the Caribbean and Gulf of Mexico were home to a distinctive biological combatant. Ships were lost to war and weather, but proportionally more vessels were lost to shipworm damage. Christopher Columbus and other explorers left vessels in the Caribbean because by the time they were ready to return to Europe the ships were unseaworthy (Smith 2007). The wooden hulls were being consumed by shipworms (Teredinidae), the most common being *Teredo navalis*. *Teredos* are actually highly specialized wood-eating marine bivalves (mollusks). They can be found throughout the world, but are more densely concentrated in the Caribbean Sea than most other bodies of seawater. Adult *Teredos* can survive freezing temperatures and varying salinity after boring inside of a wooden hull, which allowed Caribbean species to spread through the world's oceans during the age of exploration. Shipworms earned the name "termites of the sea" because they could destroy the interior part of a wooden structure before the damage was noticed externally (Turner 1966). Shipwrights used various methods over the centuries to protect ship hulls from these marine borers, including lead sheathing and sacrificial planking. Global expansion following the fifteenth and sixteenth centuries made voyages to tropical waters commonplace and increased the need for better hull sheathing technology (Jones 2004).

The search for a better sheathing material led to the suggestion of copper as early as 1708, but it was considered too expensive to develop (Jones 2004). By the 1750s, the British Royal Navy reconsidered the use of copper sheathing. Despite galvanic corrosion problems during experiments with copper sheathing on warships during the 1750s to 1770s, the Navy adopted copper sheathing in the 1780s (Lavery 2000; Jones 2004). The advantages of copper sheathing on naval vessels led to increased usage on merchant vessels. Merchants sailing in tropical waters found the sheathing increased the ship's life and widespread use led to standardization of copper sheathing nail patterns during the latter part of the eighteenth and early nineteenth centuries

(McCarthy 2005; Smith 2007). The rise in the number of coppered hulls is reflected in British ship registries. During the 1780s, only 3 percent of registered British shipping was sheathed, but by 1816, this number increased to 18 percent (McCarthy 2005). The sheathing of merchant ships appears to have been trade dependent. Slavers, East Indiamen, and post office packets were the most commonly coppered vessels. However, any ship in a high-return trade voyaging to the southern hemisphere or to tropical waters was likely to be coppered (McCarthy 2005).

Manufacturing techniques for rolling copper sheathing changed very little until the 1830s. In 1832, George Frederick Muntz formulated an alloy of 40 percent zinc and 60 percent copper he called Muntz metal. Throughout the mid to latter part of the nineteenth century, Muntz metal became the sheathing standard and led to the introduction of standard sheathing sizes (approximately 18 inches by 24 inches) and gauges (18, 20, and 22) (Lavery 2000).

Previous Investigations

Construction for “Petronius,” a deepwater oil and gas platform, began in 1997 in the Viosca Knoll Area. The area where the platform is located did not require an archaeological assessment at the time of construction. The platform’s South Module was accidentally dropped approximately 1,600 feet southeast of the platform during the module’s installation in December 1998. The South Module was damaged beyond repair and never recovered from the seafloor. In 2003, a pipeline survey for Mariner Energy detected an unidentified shipwreck south of the platform. The survey used a deep-tow AMS 120 Sonar Mapping System, which included a 120 kHz side scan sonar and 4.5 kHz subbottom system. The wreck, lying south-southeast of the South Module, was outside the pipeline survey corridor, but was imaged during a line turn. Several additional investigation lines were run over the site to obtain additional geophysical data (Church 2003). In May 2004, C & C conducted an AUV survey of the shipwreck site using *C-Surveyor I*. High-resolution multibeam bathymetry and side scan sonar data were collected on 27 survey lines criss-crossing the site. The side scan sonar showed artifact scatter west and southwest of the shipwreck (Figure 5). Numerous drag scars, characteristic of those caused by large anchor chain and cable, were also noted in this data. One light drag scar crosses the wreck’s northern end (Figure 6). An elongated seafloor depression or large drag scar exists east of the wreck (Figure 7 and 8). The southern portion of the wreck (bow) exhibits an average of 6 feet of relief with approximately 11 feet of seafloor relief at the stem.

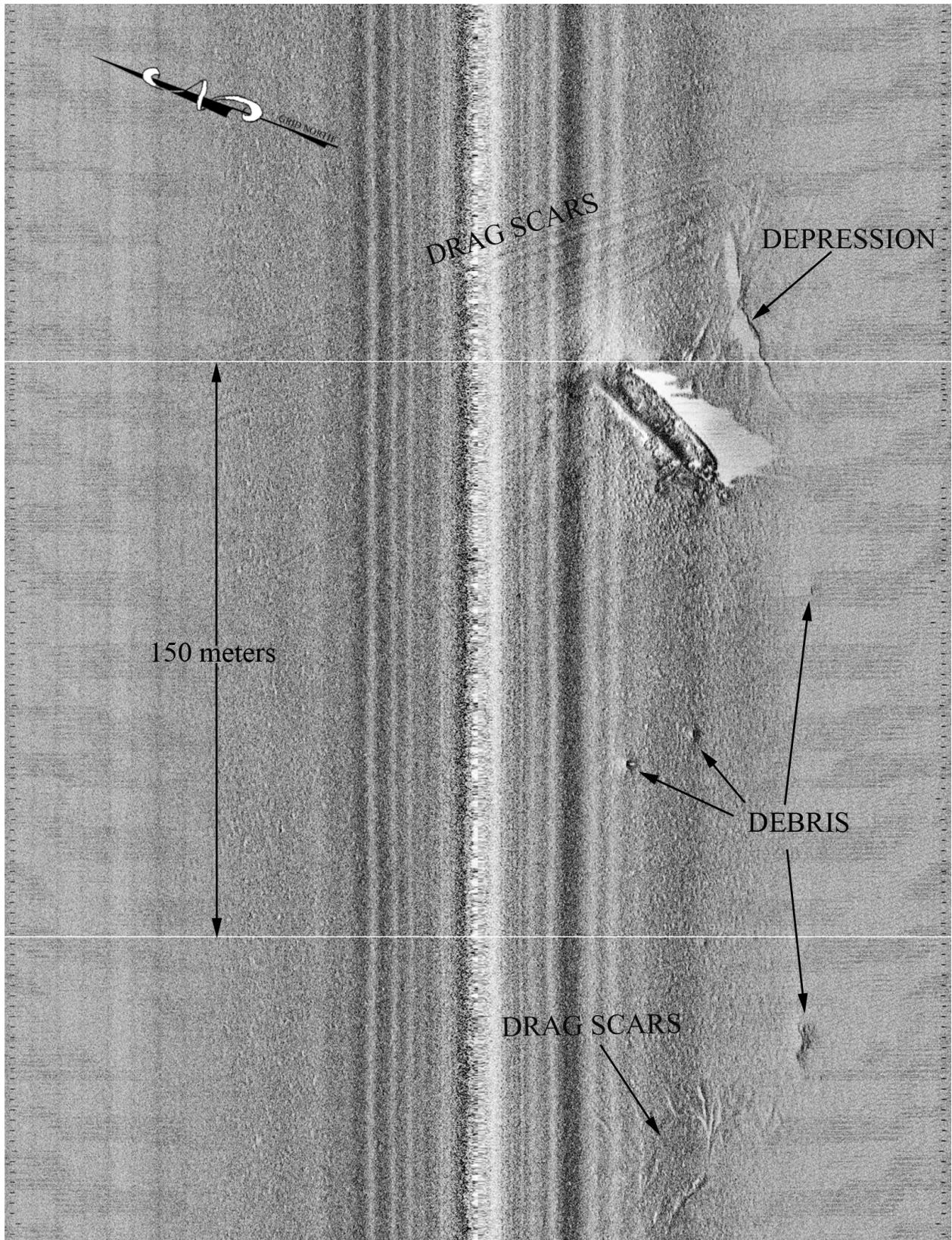


Figure 5. Side scan sonar image of the VK Wreck and surrounding area (courtesy of C & C Technologies, Inc.).

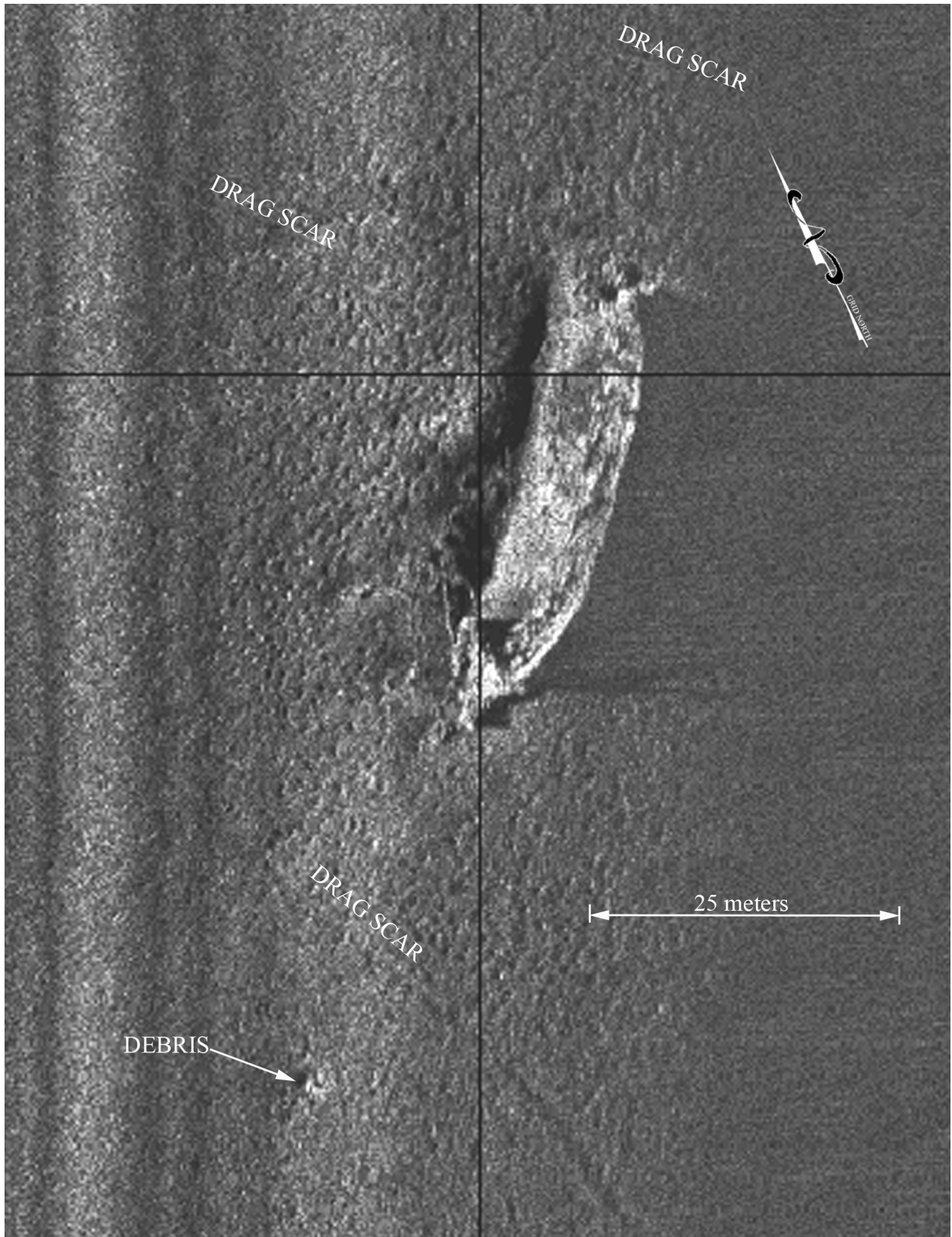


Figure 6. Side scan sonar image, close-up of the VK Wreck (courtesy of C & C Technologies, Inc.).

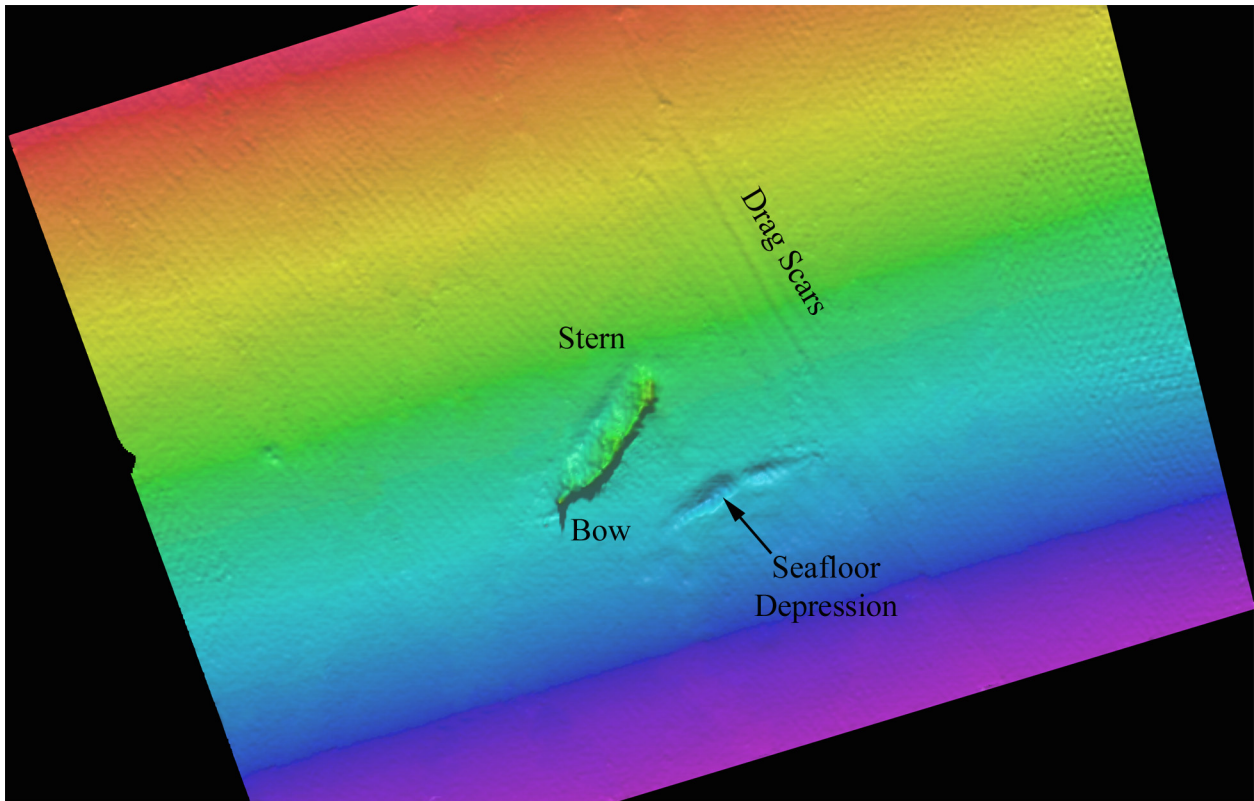


Figure 7. North-up plan view of the shipwreck. Processed multibeam image at 1.5-foot bin size (Courtesy of C & C Technologies, Inc.).

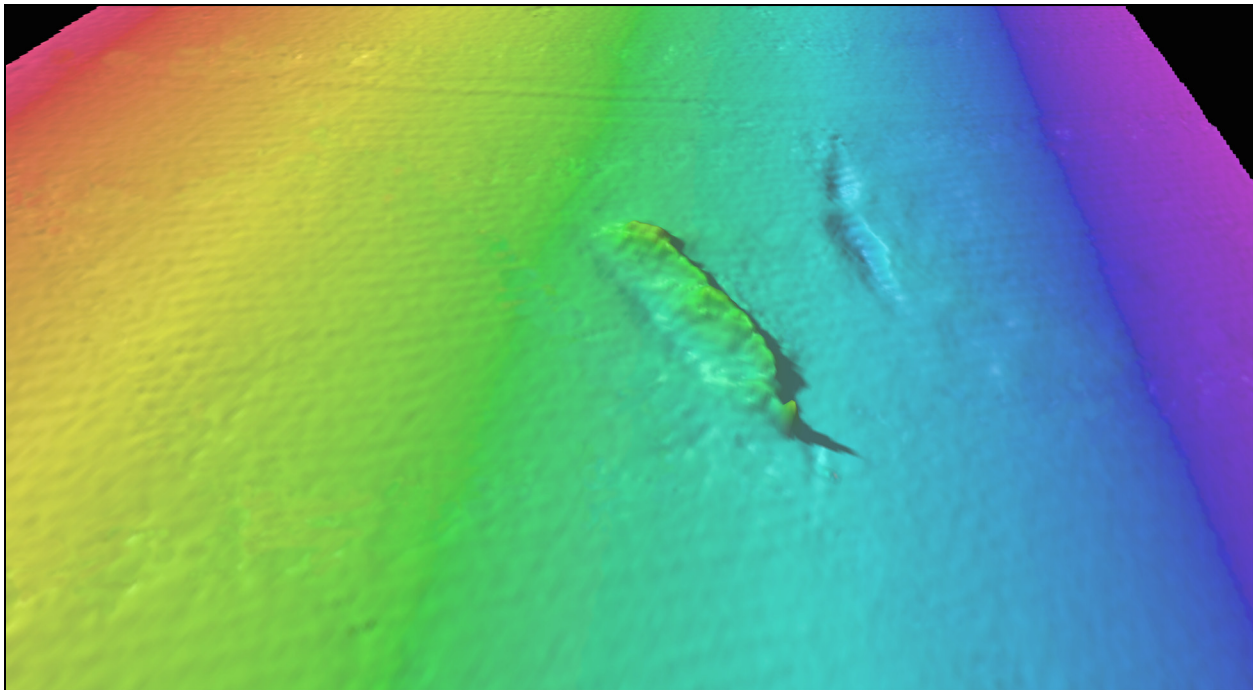


Figure 8. 3-D perspective view of the shipwreck. Processed multibeam image at 1.5-foot bin size (courtesy of C & C Technologies, Inc.).

Discussion of Findings

The following description of the wreck site is based on data collected during the July 12, 2006 site visit. The visit represented a Phase I site examination and materials were not collected from the wreck or surrounding area. Visibility on-site was poor, averaging only 8 to 12 feet. The 2006 investigation used a Saipem American Innovator Class ROV deployed from the HOS *Innovator*. The ROV was equipped with multiple cameras and adjustable intensity lighting. Video data from two forward pan-and-tilt cameras (mounted upper and lower) and one vertically mounted camera were digitally recorded simultaneously using VisualSoft software. This allowed all three cameras to be continually recorded and the footage archived in 30-minute segments with no footage breaks between segments.

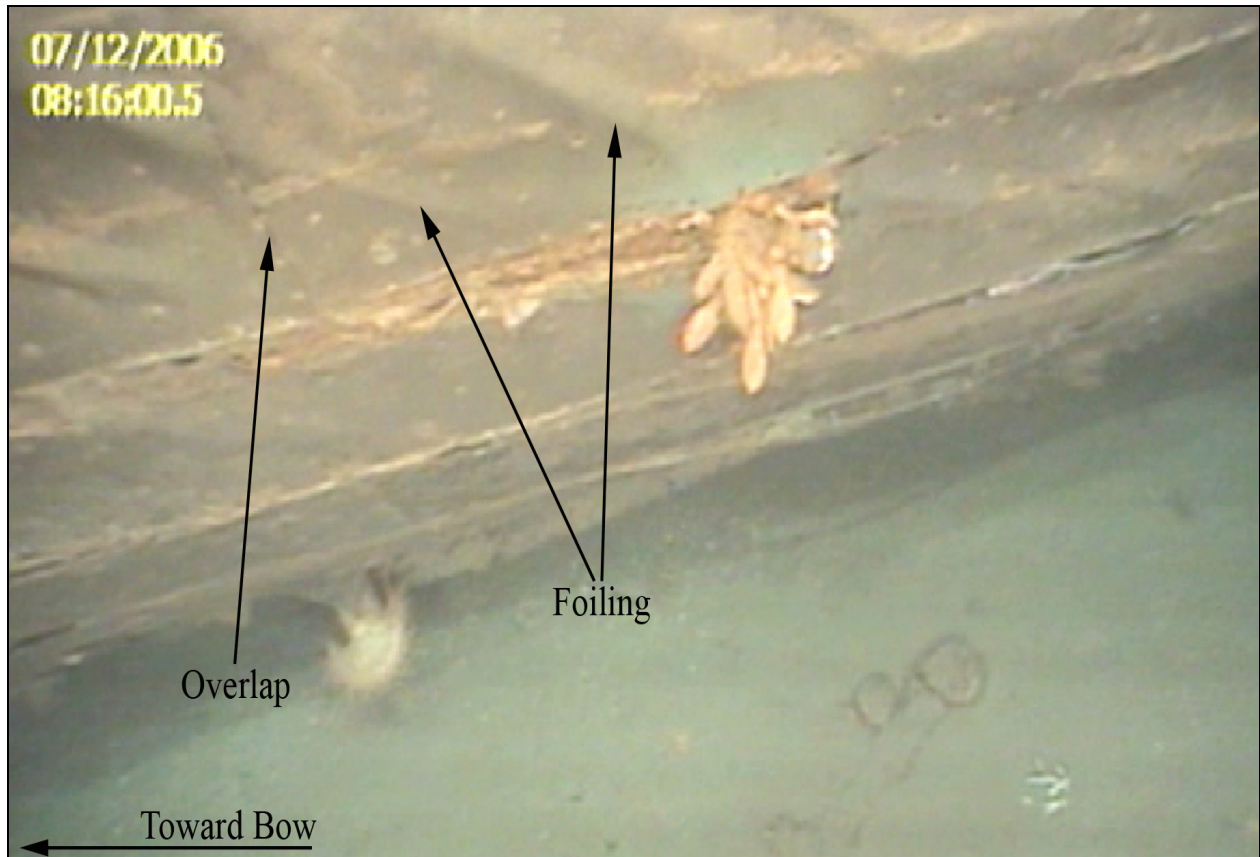


Figure 10. Copper-sheathed hull (portside).

The ROV survey consisted of an initial reconnaissance survey around the perimeter of the main hull. This was followed by running parallel to semi-parallel video track-lines over the hull remains for mosaic purposes. The mosaic lines consisted of eight lines run on a heading of 35

degrees and an equal number of reciprocal lines run on a heading of 215 degrees. Line spacing was approximately 6 feet to ensure visual overlap. Detailed visual inspections of specific areas of interest were conducted upon completion of the mosaic lines. The final part of the survey was visual inspection of outlying debris noted from the geophysical data and/or detected with the ROV's scanning sonar during the site investigation. The ROV position was continually recorded (at 6 second intervals) using a Sonardyne Ultra Short BaseLine (USBL) System.

The vessel is oriented with the bow pointing south-southwest and the stern north-northeast. Water depth at the site averages 2,010 feet. The vessel measures approximately 140 feet long and less than 36 feet at beam. It is heeled over to the starboard side making it impossible to acquire a true measure of the beam given the constraints of the investigation. It is estimated the vessel had a 4:1 or greater length to beam ratio. The starboard side is mostly flush with the seafloor, while the port side exhibits between 2 to 6 feet of relief clearly exposing the turn of the bilge and revealing important evidence about the configuration of the hull's deadrise. Marine sediments and biofouling obscure much of the construction details, but some inferences can be made regarding hull construction. Remnants of the frames, wale, and clamp are visible at some locations along the port side. The thickness of the wale and clamp is estimated to be between 2.5 and 3 inches. The construction appears to be double framing. The frames, at what is believed to be the second and third futtocks, are approximately 4 to 5 inches sided and 3.5 to 4 inches molded. The room and space is approximately 1 foot. The hull is sheathed in non-uniform lengths of copper sheeting (Figure 10). Diagonal foiling is observed along the copper sheathing. The stempost remnant stands approximately 11 feet proud of the seafloor (Figure 11 and 12). The rabbet on the stempost is clearly defined exposing the juncture of the hull strakes and revealing the curvature of hull at the bow. The bow gently rounds from the keel to the apparent water line. Possible remains of the beak and gammon irons lie beneath the stempost (Figure 13). What appear to be cant frames and possible breast hook also are visible at the bow (Figure 14). No windlass or chain was observed at the wreck site.

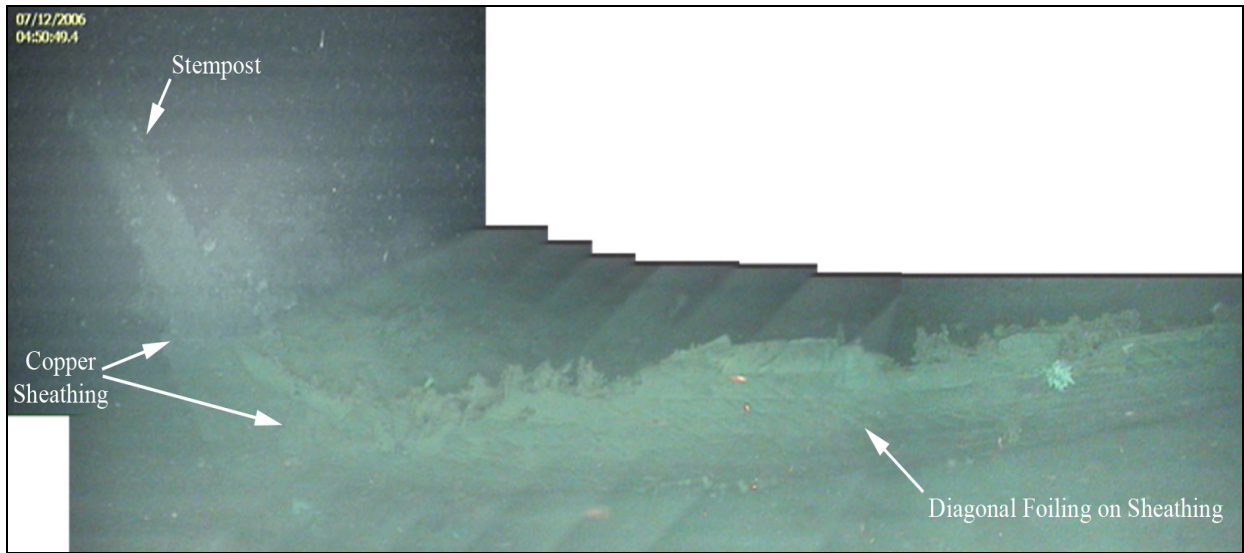


Figure 11. Profile mosaic of the bow (view from port side).



Figure 12. Looking down on the stem (view looking aft).

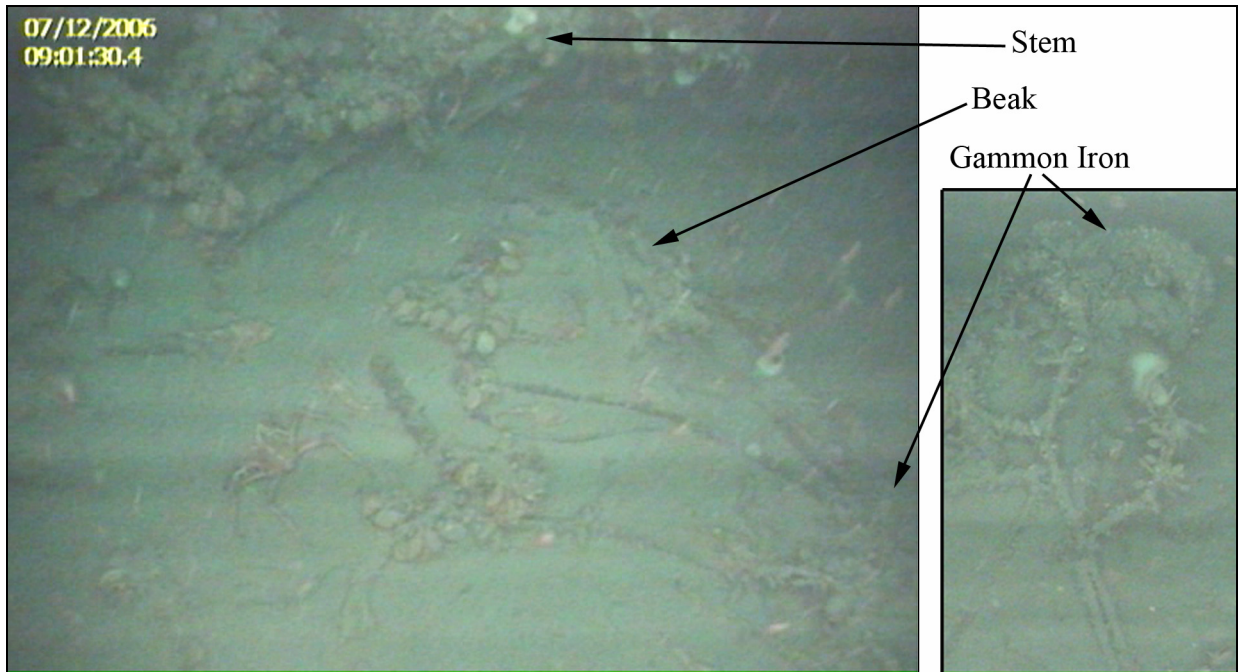


Figure 13. Possible beak and bow rigging.

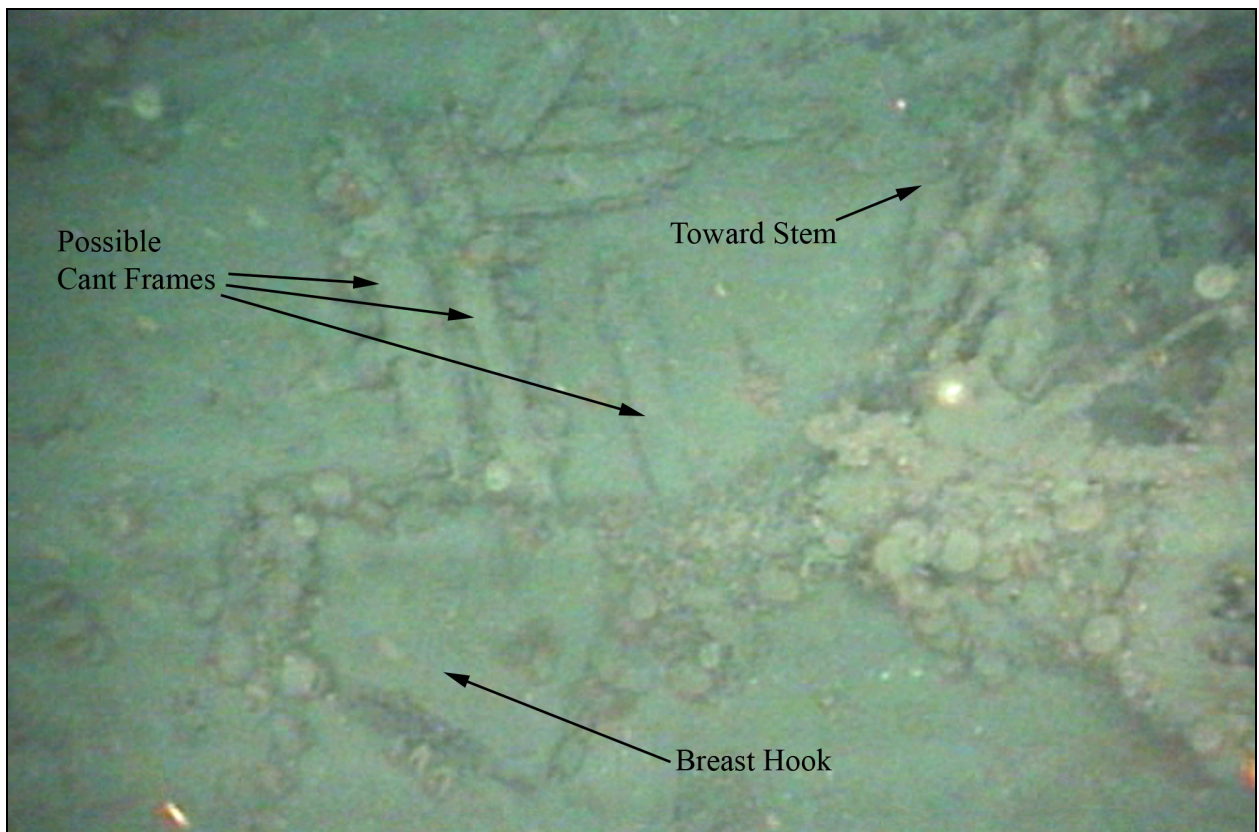


Figure 14. Possible cant frames and breast hook.

A substantial amount of apparent foremast rigging is present along the starboard side of the hull. A 21-foot long section of four-inch diameter standing rigging (possibly a main stay) lies along the seafloor adjacent to a portion of chainplate (Figure 15). A broken section of rigging also lies inside the hull at a 47-degree angle to that lying on the seafloor and may represent another section of the same standing rigging. The rigging within the hull passes through several large rigging eyes (Figure 16). The lack of corrosion product or rust suggests the rigging is hemp rather than wire rope.¹ In addition, wire rope often breaks into short sections and this rigging is continuous, which is typical of hemp. If the rigging was not heavily tarred, it likely would have been destroyed by biological and chemical processes, suffering the same fate as the unprotected wood that has long since disappeared from the site. Mast couplings are visible as well as a possible masthead block within the rigging lying on the seafloor (Figure 17). The chainplate remains and visible portions of standing rigging are likely from the vessel's port side. As the mast eventually fell to starboard with the list of the vessel, the port side rigging would have pulled away from the deteriorating hull and fallen to the seafloor on the starboard side of the hull. When the ship's mast deteriorated, only the rigging remained to mark its location. The rigging in this area of the site does not appear to have been disturbed after settling to the seafloor. The location and orientation of the rigging indicates it is the foremast rigging. The size of the rigging observed is appropriate for the foremast of a two-masted vessel, but larger than expected for the foremast of a three-masted ship.

¹ No rigging material was collected to confirm hemp or wire rope.

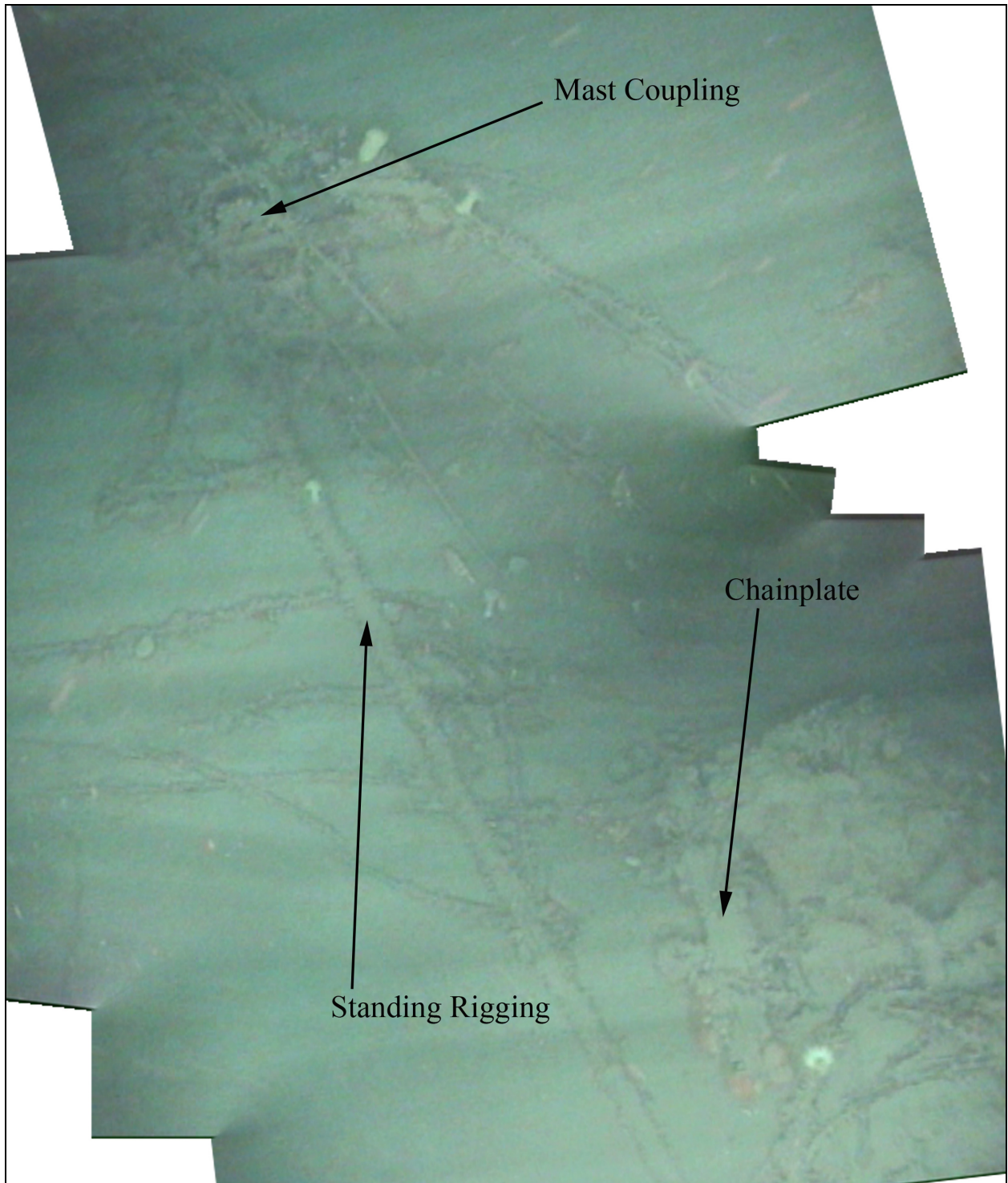


Figure 15. Foremast rigging, couplings, and chain plate lying along the starboard side.

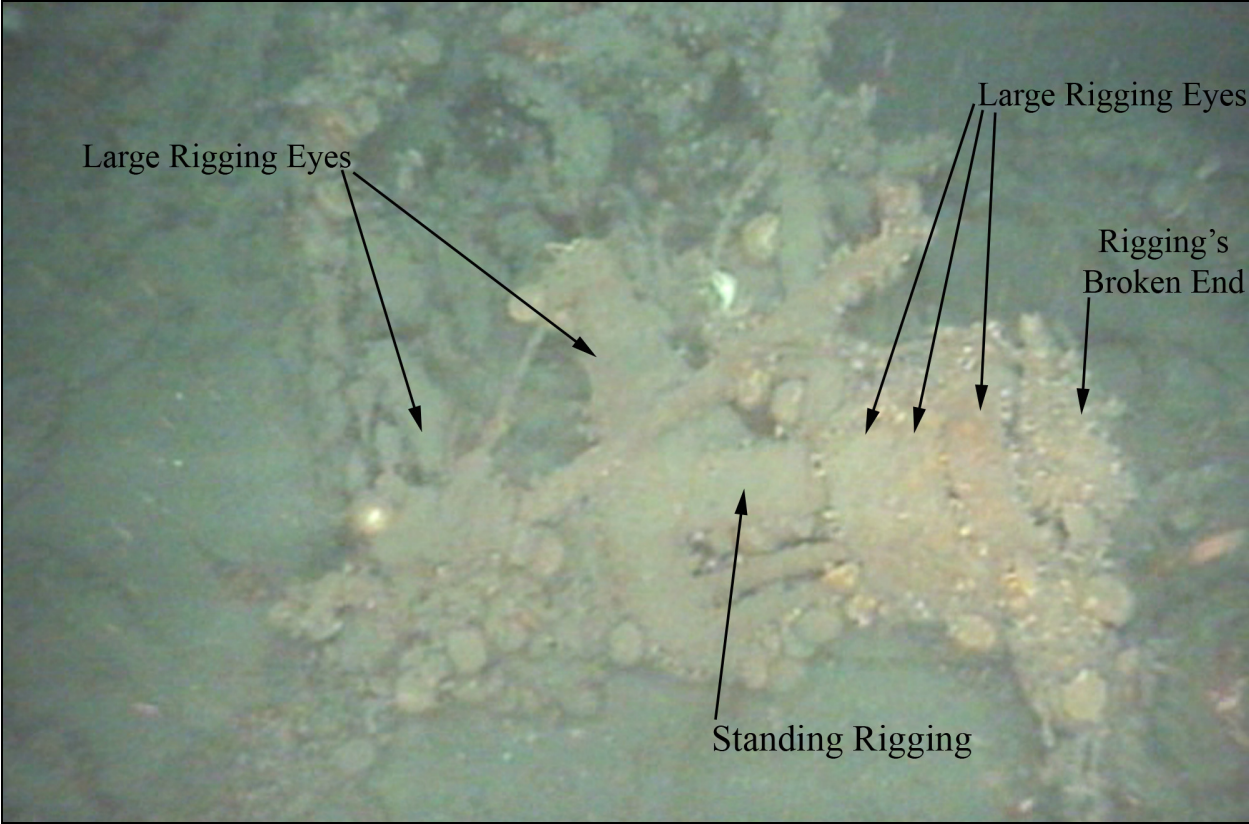


Figure 16. Large rigging within the hull.

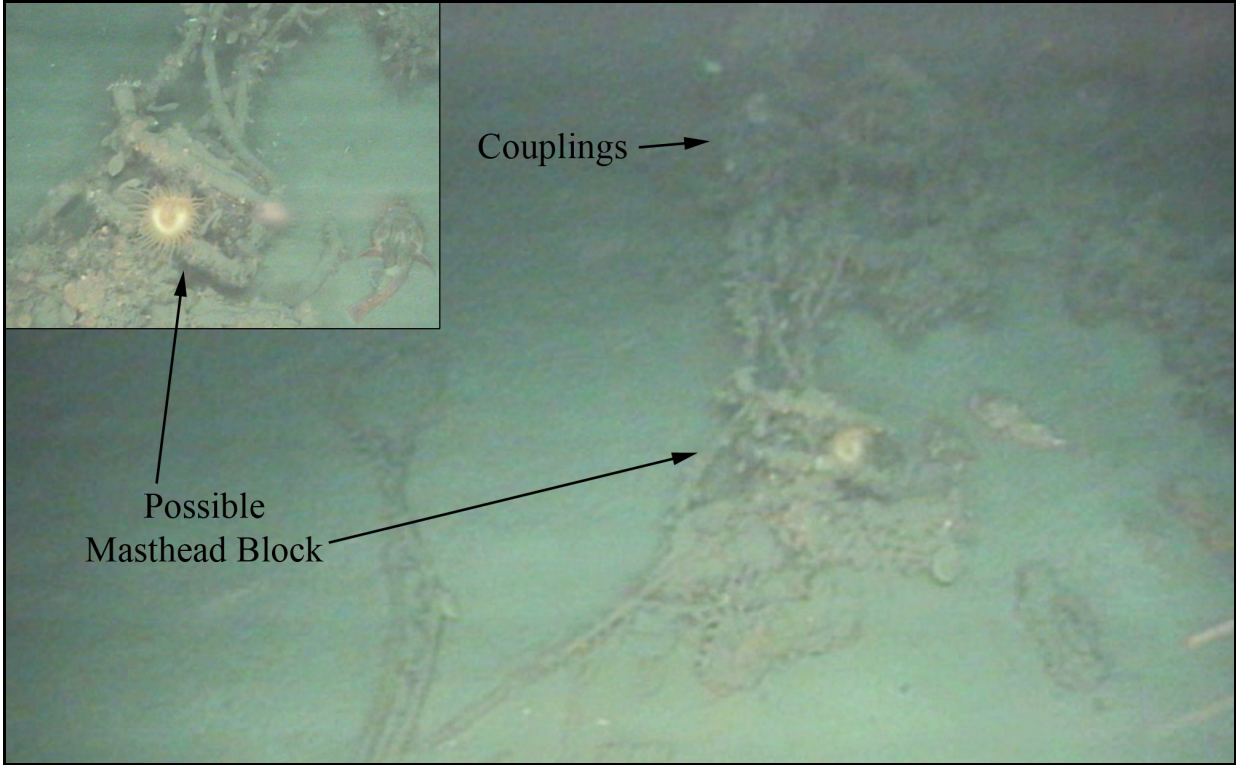


Figure 17. Possible masthead block and other rigging components.

Numerous deck beam remnants are visible within the hull. They appear to be on four-foot centers. Lodge knees and hanging knees are visible at various locations within the hull. Based on the amount of extant rigging, placement, and the size of the rigging the vessel appears to have been two-masted. The most likely vessel types for a two-masted vessel of this size are either a brig or schooner. Typical proportions for a brig or two-masted schooner places the foremast 1/4 or less of the total length from the stem and the main mast approximately 3/5 of the total hull length from the stem. These are the typical proportions; however, these are not set in stone. The foremast in both brigs and schooners were often less than a 1/4 of the of the hull's total length from the stem. The main mast, though less common, may be less than 3/5 of the hull's total length from the stem (Smith 2005, Chapman 2006, Steffy 1994, and Rybka and Moreland 1994).² If the 140-foot long VK vessel followed this traditional layout, the foremast would have been approximately 34 feet aft of the stempost and the main mast approximately 82 feet aft of the stempost. At these locations on the hull, no apparent mast partner structures are visible. However, between these estimated mast positions at 54 feet aft of the stempost are the partial remains of deck beams, carling, and lodging knees (Figure 18 and 19). The location of these heavily fortified deck beams are intriguing since they do not conform to the placement of mast partners for either a two or three masted vessel nor do they fit the dimensions for a typical main cargo hatch. The opening is approximately 4 to 5 feet and is more heavily constructed than a typical companion way. Some vessels such as slavers had a smaller hatchway. A swivel gun was often mounted at the hatch, necessitating heavier hatch construction (Smith 2007). No swivel gun or gun mount remains are observed at this location.

² Ship dimensions and construction information were compiled from documentation on the Brig *Frolic*; the U.S. Navy Brigs *Jefferson*, *Eagle*, and *Niagara*; and Fredrik Henrik af Chapman's substantial drawings of brigantines and schooners.

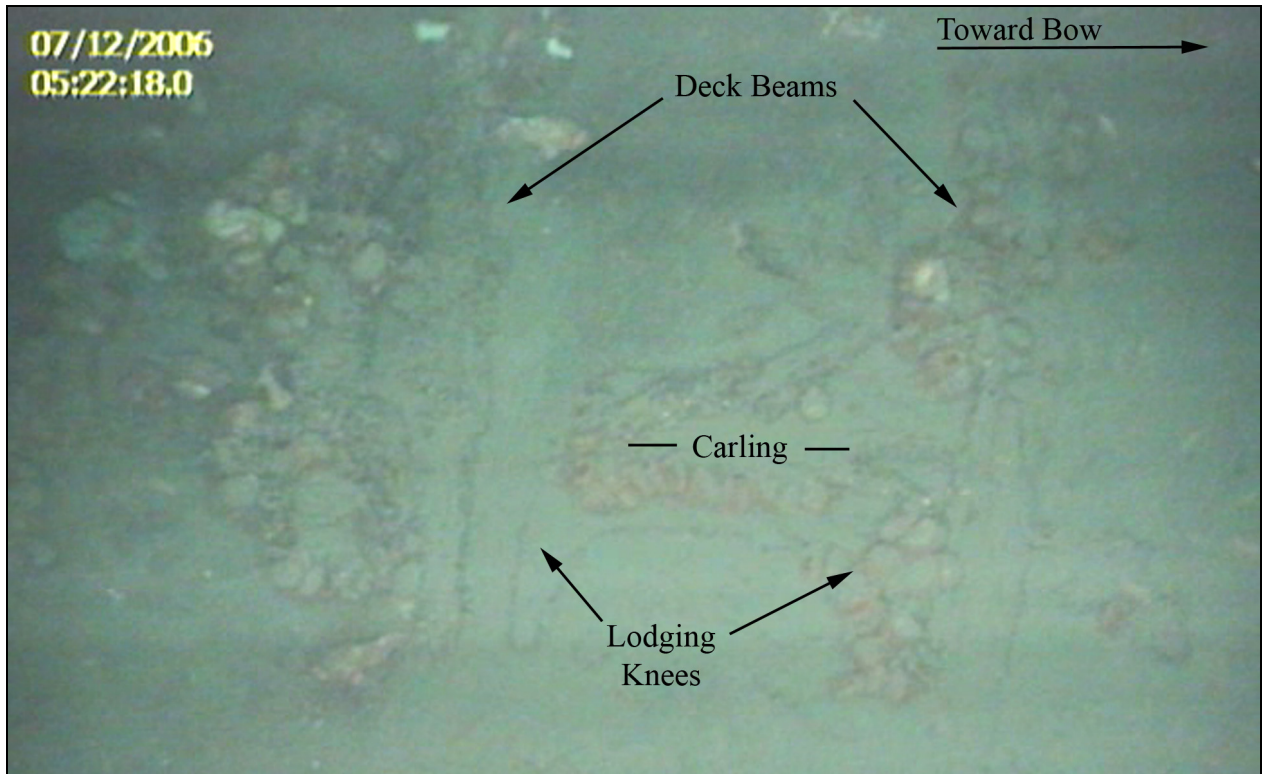


Figure 18. Hatch like structure from starboard view.

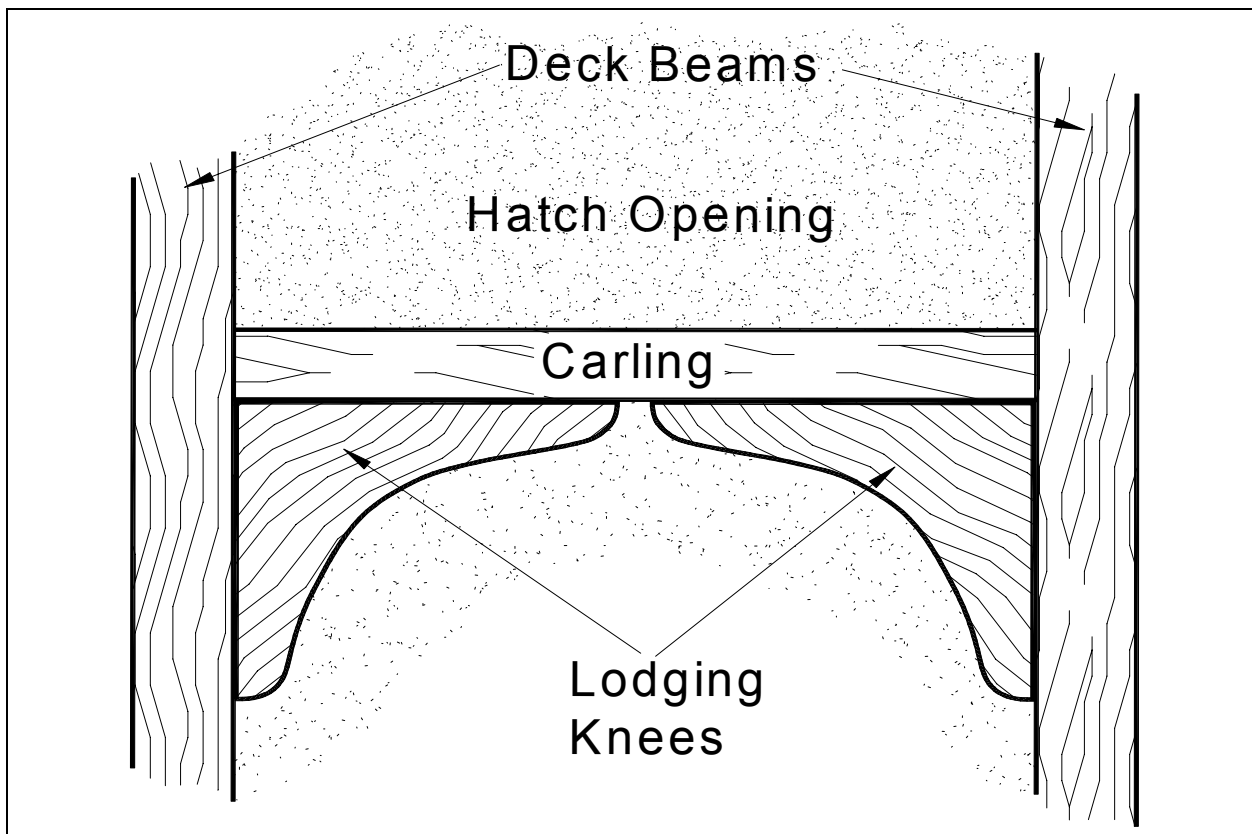


Figure 19. Hatch like structure detail in plan view (drawing by Robert A. Church).

The aft portion of the wreck is badly deteriorated and shows damage consistent with possible cable impact to the hull. A 12 to 14-inch tear in the hull's starboard side is visible approximately 53 feet forward of the stern and 90 feet aft of the stem (Figure 20). This damage correlates to a seafloor drag scar recorded on the geophysical survey data. The drag scar crosses the wreck at an approximate 29-degree angle. The location where the drag scar crosses the hull likely corresponds with the possible mainmast position. Aft of the drag scar most of the stern is missing or disarticulated. Within the jumble of the stern are fragments of a possible stern counter (Figure 21). Some of the exposed wood structure in the stern exhibited much less deterioration than the other wood material at the site, indicating possible recent exposure. Near the counter structure at the extreme stern of the wreck, portions of the copper-sheathed rudder and a disarticulated gudgeon lay exposed on the seafloor (Figures 22 and 23).



Figure 20. Tear in the port hull.

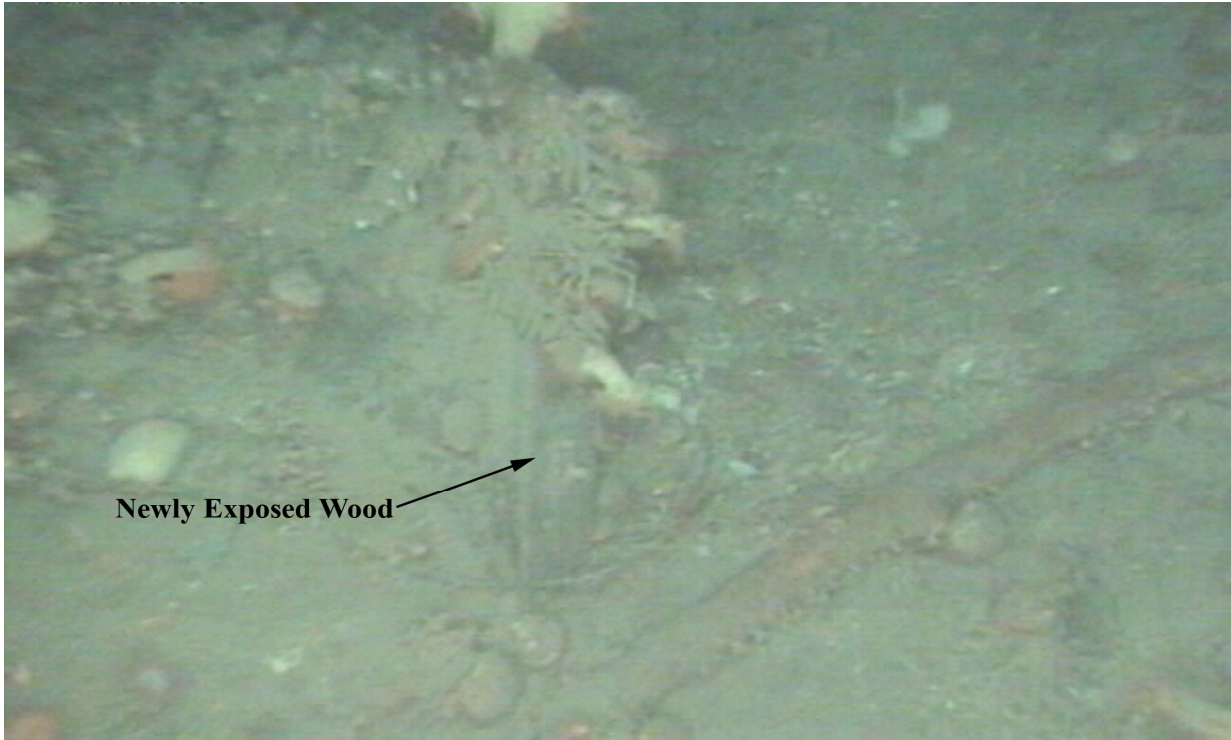


Figure 21. Fragments of a possible stern counter (possibly newly exposed wood remains).

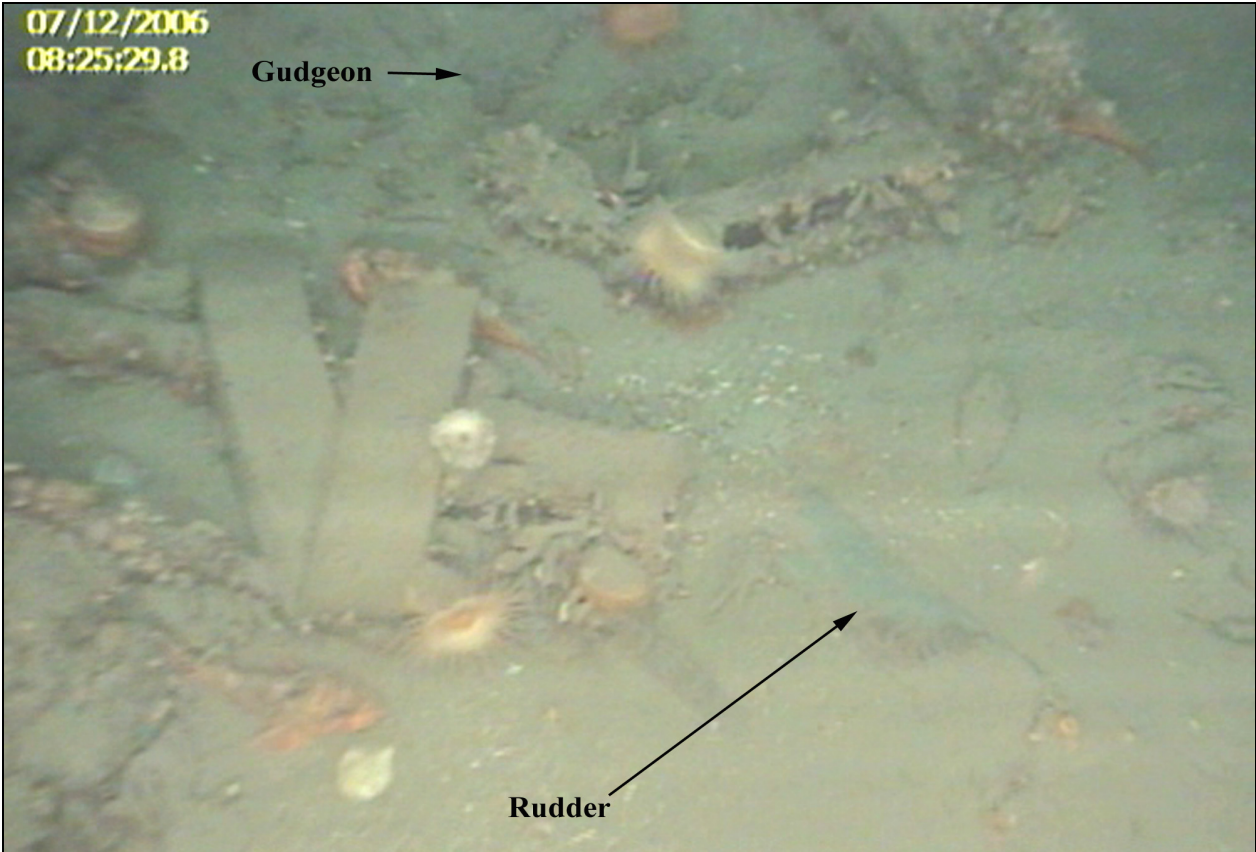


Figure 22. Copper-sheathed rudder remains and gudgeon.

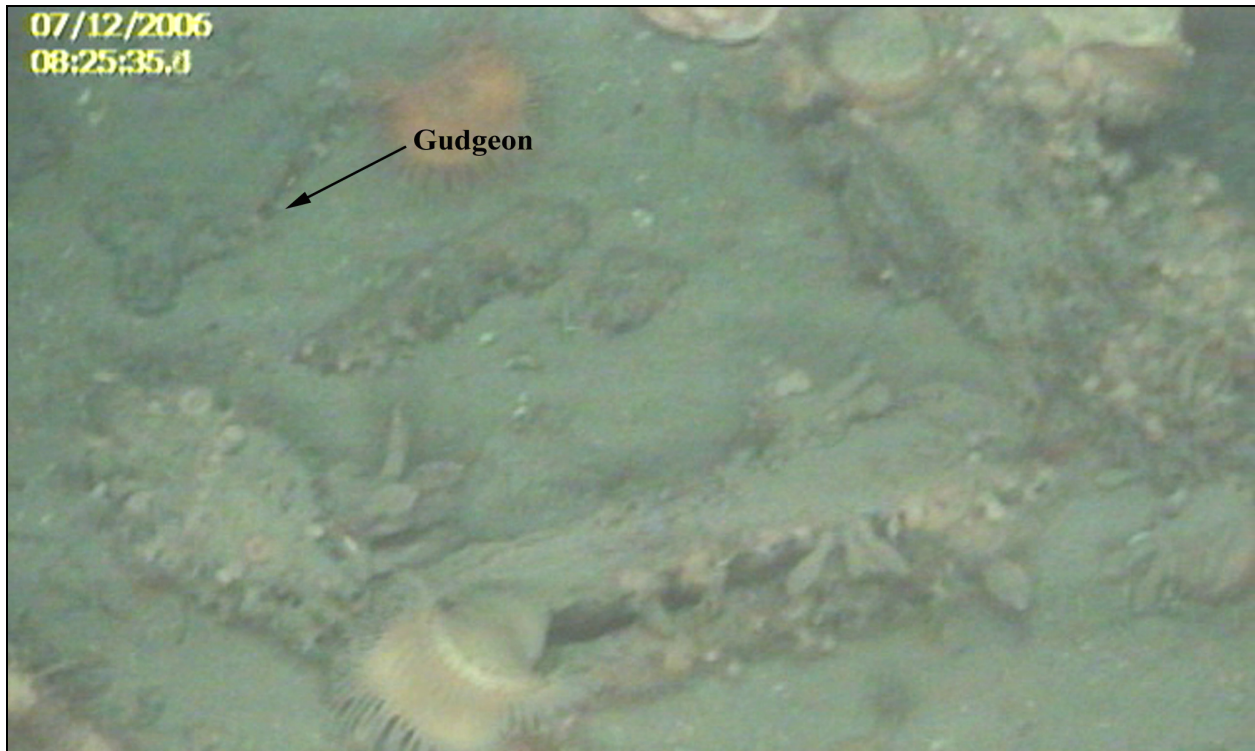


Figure 23. Gudgeon remains at the stern.

Visible near the starboard stern is a large ring, approximately three feet in diameter, which appears attached to at least 11 feet of metal shaft (Figure 24). It was initially thought to be a large anchor, but no flukes are visible. Another possibility is that it is a head ring for a gaff boom. Seven feet forward of the ring and shaft is a possible earthenware crock with a mouth diameter of approximately one foot (Figure 25). This corresponds to the size of a typical nineteenth century No. 2 crock. Nearby are eight hexagonal objects arranged side-by-side in two rows of four as if they were once in a box or bound together (Figure 26). A coil of heavy line is 45 feet forward of the stern on the starboard side (36 feet forward of the ring and shaft). This may be a coil of stowed rope, but is likely lacing remains from the main mast rigging. The coil is located across from the estimated main mast position. If the vessel had a fore-and-aft gaff rigged sail, the mast lacing or hoops would have slid down the mast to the spanker boom as the sail deteriorated (providing the lacing or hoops lasted). With the vessel heeled to starboard, the lacing/hoops likely would have come to rest to the starboard side of the hull. Mast remains have not been found on any early period sailing vessels investigated in deepwater in the Gulf of Mexico, but rigging remains have often been documented. When a mast deteriorates through chemical and/or biological means, the lacing could be left behind in a coil. The drag scar that

crosses the wreck missed the coil of line by approximately 11 feet. No other rigging is visible near this portion of the hull.

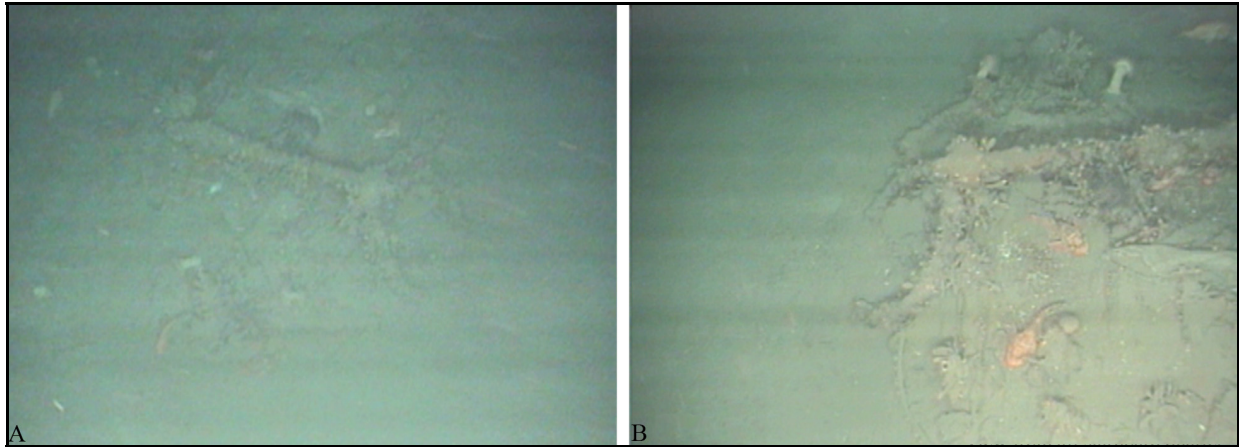


Figure 24. Possible gaff head-ring: (A) view looking forward and (B) view looking aft.

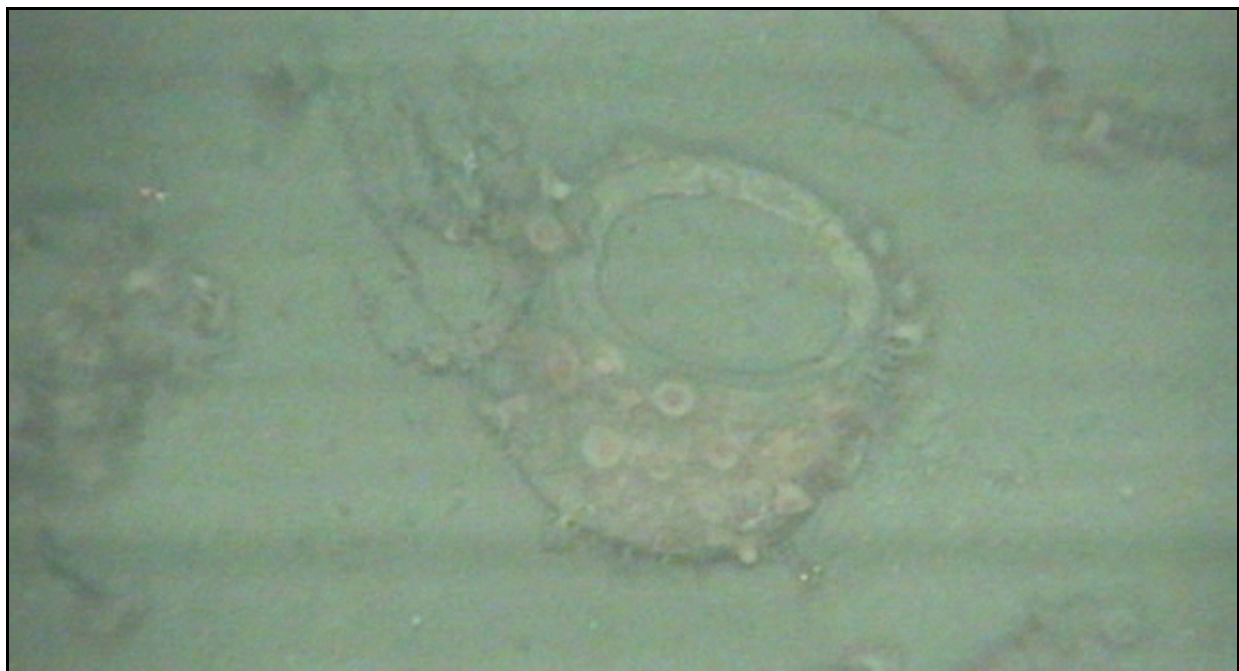


Figure 25. Possible earthenware crock.



Figure 26. Eight hexagon-shaped objects near suspected earthenware crock.

Outlying Material

A mass of rigging, including mast couplings, is present 468 feet west-southwest of the hull. This may be rigging from the main mast, which was notably absent near the hull. A line of other debris was observed between the hull and this rigging. The largest outlying artifact observed is a patent stove standing upright in a seafloor depression (Figure 27). It measures approximately 2 feet wide and 1.3 feet deep. It has a band around the edge to keep food from sliding off the surface. Accurately estimating the stove's height is not possible because of the angle of view and the fact that the feet are partly embedded in the seafloor. The stove is located 242 feet west-southwest of the hull. A possible lantern (Figure 28) and an unidentified object (Figure 29) were also found 208 feet west-southwest and 124 feet south of the hull, respectively. The lantern is approximately 1 foot wide and 1.5 feet high. The viewing glass is not visible and may have fallen inside the body or is missing altogether. The unidentified object measures approximately 1.5 feet in diameter and is covered with biofouling.



Figure 27. Patent stove found away from main hull.

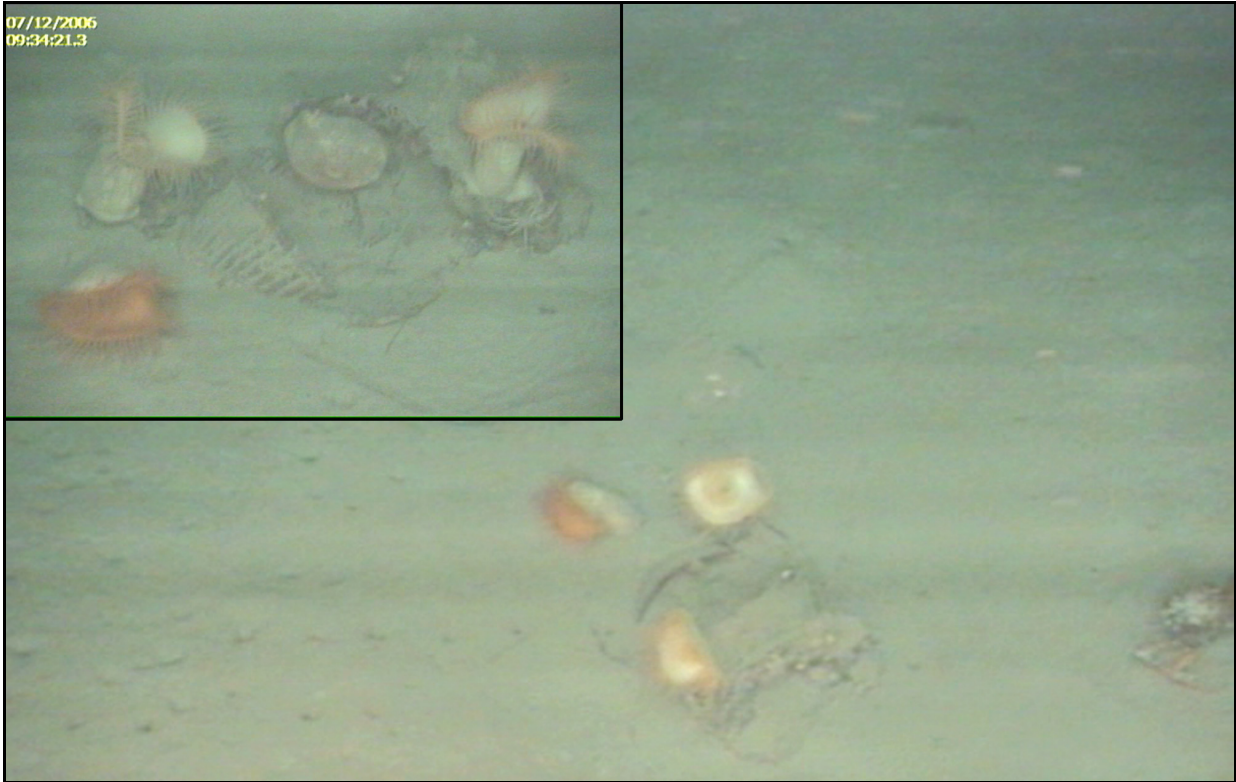


Figure 28. Lantern away from main hull.

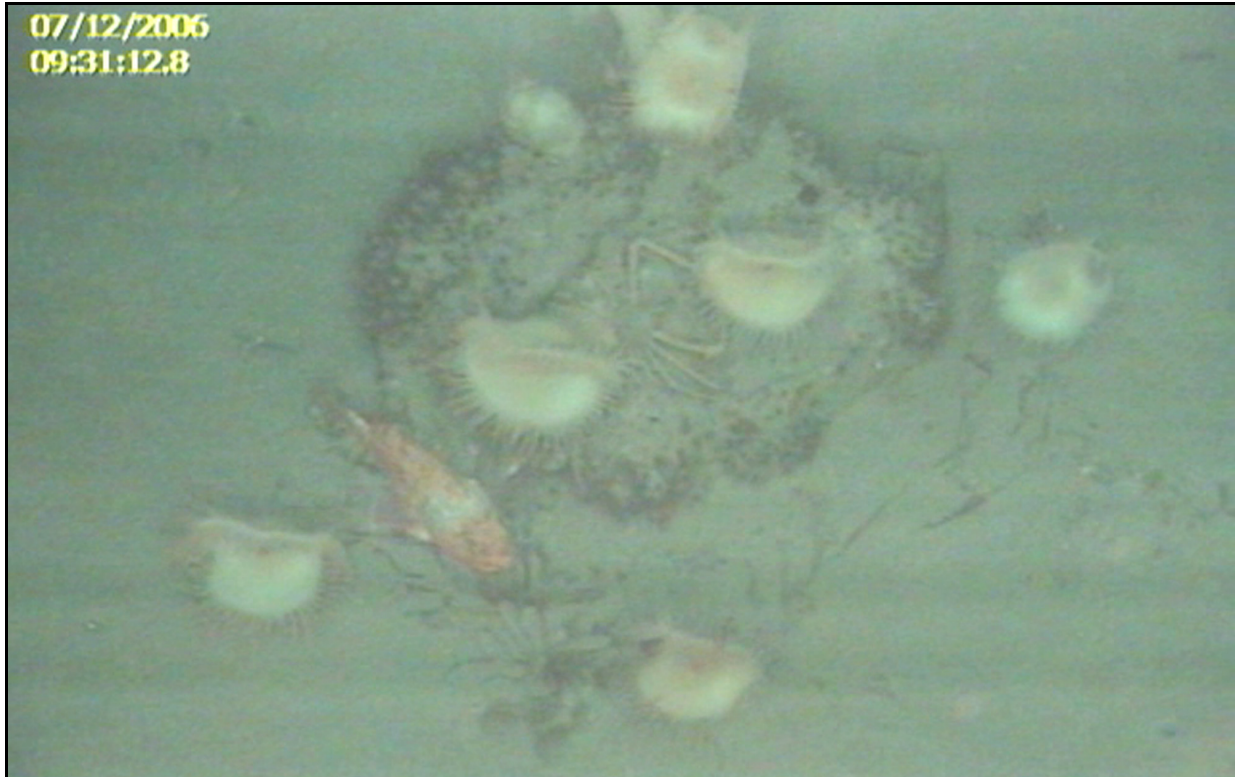


Figure 29. Unidentified object away from main hull.

Preliminary Biological Assessment

Two types of scorpion fishes are present at the site. Tentatively identified blackbelly rosefish (*Helicolenus dactylopterus*) and Atlantic thornyhead (*Trachyscorpia cristulata*) were seen at the patent stove and at other locations on the wreck (Figures 27, 30, and 31).³ Numerous macroinvertebrates were recorded at the site including various species of deep-sea crabs (Figures 13, 28, 29 and 32). Venus flytrap anemones (*Actinoscyphia* sp.) are taking advantage of the hard substrate provided by the wreck and are abundant throughout the site (Figure 27-31). Sessile megafauna such as the branching deep-sea coral tentatively identified as *Lophelia pertusa* are also utilizing the hard substrate of the wreck. Small coral colonies were also observed growing on various parts of the wreck. Branching coral was recorded along the edge of the patent stove (Figure 30, and 31), on the stempost, and at a few locations along the edge of the port hull (Figure 33 A and B). The largest recorded colony is lying on the seafloor and measures approximately 8 x 12 inches (Figure 33 C).⁴

³ Images were sent to Dr. William Patterson, University of West Florida, for preliminary identification of marine vertebrates. No voucher specimens were collected.

⁴ Video data was sent to Dr. William Schroeder, University of Alabama and Dauphin Island Sea Lab, for preliminary identification of *Lophelia pertusa*. No voucher specimens were collected.



Figure 30. Blackbelly rosefish around the patent stove. Venus flytrap anemones and branching coral are attached to the stove.

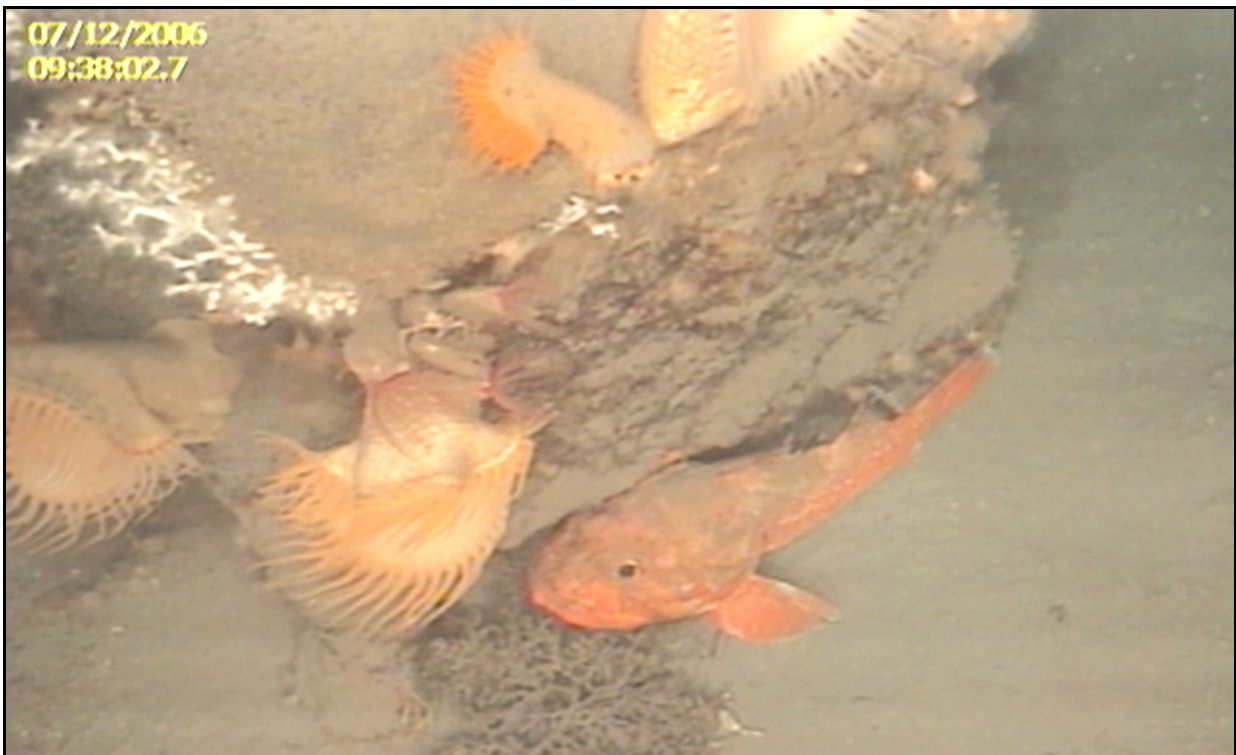


Figure 31. Atlantic thornyhead beneath the patent stove. Venus flytrap anemones and branching coral are attached to the stove.



Figure 32. Small crabs on the gammon irons near the bow.

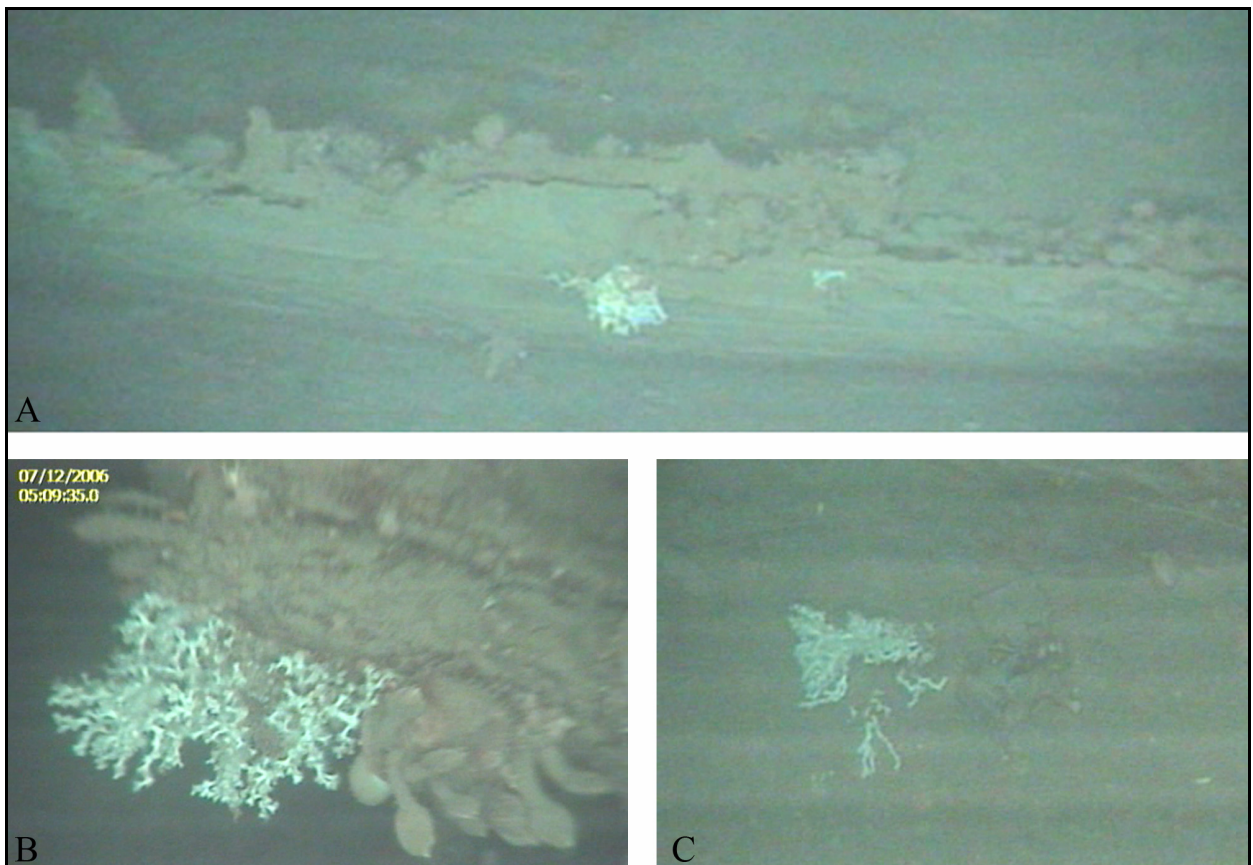


Figure 33. Tentatively identified *Lophelia pertusa* growing on the site: (A) along the edge of the port hull (8 in. x 8 in.), (B) on the stempost (7 in. x 10 in.), and (C) on the seafloor near the hull (8 in. x 12 in.).

Site Preservation

The wreck site is in a moderate state of preservation. The hull is partially intact where it is sheathed with copper. The copper's anti-biofouling properties likely offered some protection to the hull sections in direct contact with it. This is consistent with other Gulf of Mexico deepwater discoveries, where wooden hull remains are present in conjunction with copper sheathing and largely absent above the line of sheathing. The bow is partly intact, but the stern is disarticulated. The vessel's portside is elevated because the ship is heeled over to starboard. The starboard side is mostly buried. A definite determination cannot be made of the starboard hull's preservation state, but it could be intact beneath the seafloor.

Identification and Dating from Visual Evidence (from Dr. Sheli O. Smith, Past Foundation)

- The use of long copper sheets and standardized nail pattern places the date range between the 1780s and 1830s.
- The lack of visible ordnance suggests a merchant vessel rather than a naval vessel.
- Copper sheathing did not move into the general shipping construction until well after its use by the navy pushing the date of the vessel more toward the nineteenth century.
- On two-masted vessels the rig for the period between 1780 and 1830 could be a brig or a schooner. Brigs were introduced in the 1770s and remained a popular rig type throughout the Age of Sail. Brigs were especially popular for vessels that combined close-haul coastal sailing and open water sailing. Schooners gained popularity after 1815, but did not generally involve two masts or more until after the 1850s.
- The boxy shape of the patent stove suggests a date range in the early nineteenth century. As casting techniques improved in later years ornate legs and decorated fronts became more common.⁵
- The stern counter that overhangs the sternpost is a late eighteenth to early nineteenth century design.
- The bow does not have a reverse curve often associated with clipper bows of the 1850s. Instead, the bow is gently rounded from the keel line to the water line, which is more reminiscent of the late eighteenth century to early nineteenth century.
- The hull appears to have a visible angle of deadrise along the entire run of the hull also placing the vessel in the first quarter of the nineteenth century (Figure 34).⁶

⁵ Iron casting, in general, became more ornate by the mid-nineteenth century and galley stoves were no exception as evidenced by stoves documented from several nineteenth-century wreck sites such as *CSS Alabama*, *CSS Neuse*, *North Carolina*, the Tar Schooner Wreck, and the Hilton Wreck (Watts 2007; and Sanders and Gould 1976).

⁶ Additional site investigation is necessary to measure the true angle of deadrise of the hull. By the mid-nineteenth century, the trend was toward flatter bottomed vessels with less deadrise, although hull design varied with ship type

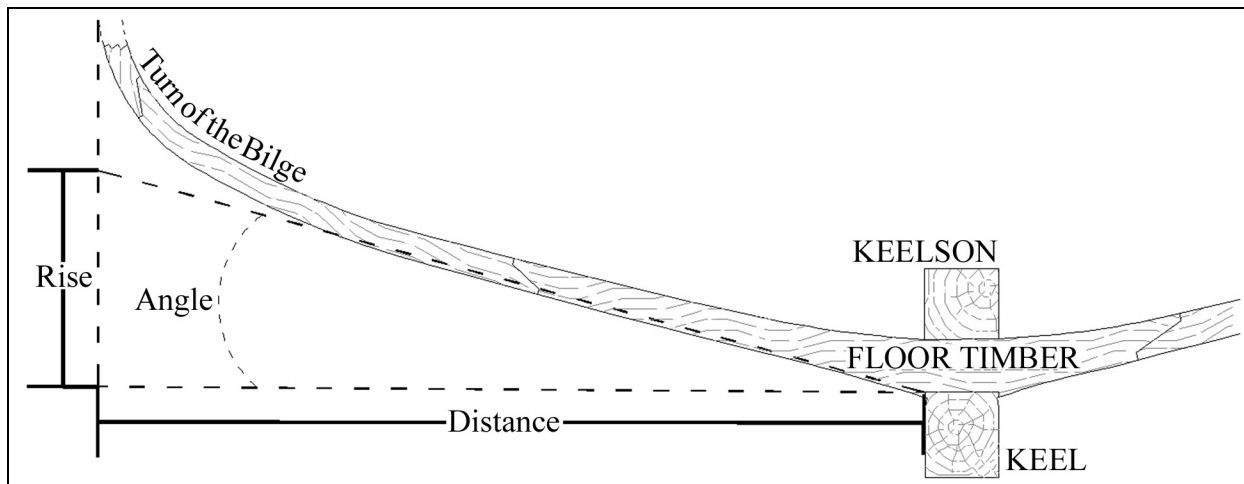


Figure 34. Typical midship frame construction, cross-section view illustrating deadrise similar to what is expected on the VK Wreck (Drawn by Robert A. Church; for further information see Steffy 1994).

Identification Potential

A review of the MMS shipwreck data indicates over 70 sailing vessels have been lost in the Gulf of Mexico from the beginning of the seventeenth century to the end of the nineteenth century. This excludes most wrecks that were known to have grounded in state waters or that have been found. Some vessels were listed, however, even though it was questionable whether they grounded or were lost in open water. The historical information is lacking concerning many of these losses. Several named vessels, particularly during the earlier centuries, actually represent entire fleets lost to storms. Of these 70 plus shipwrecks, only 10 named vessels were listed between 1776 and 1842 (Table 1). The construction dates are not known for these ten vessels. Most of these wrecks can be tentatively eliminated as possibilities for the VK Wreck. *La Caraquena* lost 1776, *America La Reseda* (fleet) lost 1779, and *Galgo* lost 1783 are likely too early to represent the VK wreck site. *Ardilla* is listed as an 18-gun barkentine lost in 1808. No cannon were observed at the VK Wreck site nor is the construction consistent with a heavily armed naval vessel. *Racer* was a small clipper lost in 1814 and is too small (93.5 feet in length) to be the VK Wreck. The schooner *Volador* was lost in 1815, possibly at Pensacola, Florida. *Atlas* (unknown vessel type) was lost in 1816, possibly on a reef in the Florida Keys. The merchantman *Navigator* was lost in 1821, possibly at Chandeleur Island, Louisiana. That leaves

and purpose. By the end of the nineteenth century, it was common for ships to have low angle of deadrise amidships and extreme deadrise at the bow and stern (Watts 2007; and Smith 2007).

only *Aravrana* and *Mary* (both unknown vessel types). *Aravrana* was a Spanish vessel carrying mail and lost during an 1811 hurricane reportedly near Florida. *Mary* was lost in 1842 reportedly near the Florida Middle Grounds and her nationality and cargo is not known. It is also possible the VK Wreck is a vessel not yet listed in the MMS database.

Table 1
Sailing Vessels Lost between 1776 and 1842 in the Gulf of Mexico

Name	Date Lost	* Location Reliability	Vessel Type	Comments
<i>La Caraquena</i>	1776	4	Galleon	Possibly lost off Galveston Island, TX
<i>America La Reseda</i>	1779	4	Ship	Only named ship of a fleet lost
<i>Galgo</i>	1783	4	Unknown	Nationality and cargo unknown
<i>Ardilla</i>	1808	4	Barkentine	Carried 18 guns
<i>Aravrana</i>	1811	3	Unknown	Cargo of mail
<i>Racer</i>	1814	4	Cutter	250 tons, 93.5' x 25'
<i>Volador</i>	1815	4	Schooner	Possibly lost at Pensacola, FL
<i>Atlas</i>	1816	2	Unknown	Possibly lost on a reef in the FL Keys
<i>Navigator</i>	1821	4	Merchant	Possibly lost at Chandeleur Island, LA
<i>Mary</i>	1842	4	Unknown	Nationality and cargo unknown

* Location reliability based on scale 1 to 4, 1 being reliable, and 4 being unreliable

Conclusions and Recommendations

The following is a likely scenario for the wreck site's formation processes. During the wrecking process there was likely damage to the rigging and/or possibly the integrity of the hull. As the vessel descended, the pressure increased on the hull to 62 atmospheres (~911 psi) by the time it reached the seafloor. Since wood is a cellular organic material, the pressure on the wood hull may have accelerated the deterioration of the shipwreck by causing structural components to loosen or pull apart. The increased pressure may explain the foiling observed along the copper sheathing on the outer hull. The vessel came to rest on the seafloor and heeled to starboard. The sails and other light organic material would have deteriorated first, followed by hull remains above the copper sheathing and sediment line. Due to the list of the hull the natural tendency of objects was to fall to starboard. This is reflected in the jumble of rigging near the bow and the random objects lying on the seafloor adjacent to the starboard edge of the hull. Deteriorating gunwales would have caused the chainplates and pin rails to give way allowing the masts and

rigging to fall to starboard. Stresses on the visible section of large standing rigging from the foremast could have caused it to snap, with a portion of the mast or possibly one of the lower yards tumbling to the seafloor next to the wreck. The ghosted outline of a long object lies just under the sediment to the starboard of the wreck near the articulated standing rigging.

The wreck probably lay mostly undisturbed, slowly breaking down, after coming to rest on the seafloor until recent times. The exposed “fresh” wood in the disarticulated stern reflects recent disturbance, possibly within the last decade. This evidence, coupled with the distinctive drag scars, paints a fairly accurate picture of the most recent site disturbance. Sometime within the last decade a large cable lay across the site, in all likelihood attached to an anchor placed southeast of the wreck. The angle of the distinctive drag scars around the wreck site and the deep furrow just off the portside indicate that this incidental contact caused the observed damage to the hull’s stern portion. The bounce of the cable may have caused entanglement with the exposed objects and rigging at the stern of the vessel. When the cable lifted from the seafloor the entangled objects and rigging were likely drug from their original locations, finally dropping off the cable away from the wreck site. Approximately 500 feet to the west-southwest lays the second mass of rigging and in between the rigging and shipwreck is a debris trail containing the patent stove and possible lantern. The artifacts recorded between the hull and outer rigging pile may have been displaced at this time or on multiple occasions. There are multiple seafloor drag scars near the stern, but it is not known if these are from the same cable that caused the other damage or an additional anchor cable.

The size of the vessel, amount of rigging, and the size and location of the foremast rigging suggests this was a two-masted vessel. The possible lacing remains and gaff head ring suggests a brig, brigantine, or schooner rig. The shape of the bow is more characteristic of a brig or brigantine than that of a schooner. The construction details and limited artifact remains observed on site point to a date within the first quarter of the nineteenth century. Most of the organic materials above the water line are gone except the rigging, which appears to be tarred rope. The vessel’s identity, nationality, exact construction date, or date of loss cannot be determined based on available data. The vessel appears to date to a similar period as the Mardi Gras wreck site

located 46 nautical miles to the southwest (Mardi Gras 2007). Although a possible connection between the two vessels is intriguing, it is unsubstantiated at this time.

Various vertebrates and invertebrates such as scorpion fish, sea anemones, deep-sea crabs, and branching corals are utilizing the hard substrate the wreck site offers. The coverage of branching coral, tentatively identified as *Lophelia pertusa*, is sparse, but present at numerous locations on the site. In light of the presence of coral on this small structure, the Petronius South Module structure that is lying on the seafloor less than 2,000 feet to the north-northwest of the wreck, will be worth investigating on future visits to the site.

The MMS is mandated to consider the potential effects all permitted activities may have on archaeological resources (the OCS Lands Act, the National Historic Preservation Act, Executive Order 11593, and the National Environmental Policy Act). With regards to this mandate, the MMS currently requires a minimum 1000-foot radius avoidance at the site for any activity that could potentially impact the seafloor and adversely affect the site other than approved archaeological and scientific investigations. Based on the available geophysical survey and ROV data this avoidance criterion is sufficient to protect the site from disturbance.

Additional investigation is needed to further define the wreck's identity, nationality and its usage. Future work at the site should include limited material collection. Rigging, sheathing, and limited wood samples would aid in the interpretation of this site and other deepwater shipwrecks in the Gulf of Mexico. This wreck undoubtedly contains a tremendous amount of cultural material buried within the hull. Careful sediment removal from selected locations on the site could yield a wealth of information regarding the wreck's identity, construction attributes, and cultural significance. This wreck has the potential to greatly expand our understanding of shipbuilding and shipboard life during this period. In addition, creating a baseline compilation of things like wood speciation, wood compression at depth, metal assay, and cargo type, along with a baseline catalog of fauna utilizing the site, would be of tremendous value to a wide array of sciences as well as a remarkable boost to the seriation of ship construction typology.

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The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.