An Archaeological Survey and Site Investigation of 18PR226, a War of 1812 Shipwreck (Suspected USS *Scorpion*) in the Patuxent River, Maryland

Field Investigations 2010

A collaborative project of:

Naval History and Heritage Command
Maryland State Highway Administration
Maryland Historical Trust

Prepared by:
Department of the Navy
Naval History and Heritage Command
Underwater Archaeology Branch
805 Kidder Breese Street SE
Washington, D.C. 20374-5060

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Principal Investigators:
Robert S. Neyland, Ph.D.
Department of the Navy

Julie M. Schablitsky, Ph.D.
Maryland State Highway Administration

Susan B. M. Langley, Ph.D.
Maryland Historical Trust

Authors:
George Schwarz
Alexis Catsambis
Bradley A. Krueger
Heather G. Brown
Blair Atcheson

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EXECUTIVE SUMMARY

In July and August of 2010, the Underwater Archaeology Branch (UAB) of the Naval History and Heritage Command (NHHC), along with partners Maryland Historical Trust (MHT) and Maryland State Highway Administration (MD SHA), conducted a remote sensing survey and limited excavation of site 18PR226 in the Patuxent River, near Upper Marlboro, Maryland. The site, originally discovered in 1979, is suspected to be the remains of USS *Scorpion*, flagship of the Chesapeake Flotilla during the War of 1812. The entire flotilla was scuttled in 1814 to prevent capture by the British during their advance on Washington DC.

As part of the commemoration of the bicentennial of the War of 1812, it was proposed to relocate and investigate the site. Magnetometer and hydro-probe surveys were conducted in 2009 and 2010 to determine the exact location and orientation of the remains beneath the seabed. Once these data were acquired, test units were opened to determine the extent and level of preservation of the hull.

The 2010 field season was the first phase of a multi-year investigation, preparatory to installing a cofferdam around the site in 2013. This will enable complete excavation of the site with possible stations for visitors to observe archaeologists at work, generating public interest and providing opportunities to educate the public about the role of the Navy in the War of 1812 and the defense of the nation's capital.

Two of the excavated test units revealed sections of the ship's deck, one near the hold, an area previously excavated in 1980 by a team led by Donald Shomette, and one further upstream. These finds provided confirmation that the shipwreck had been successfully relocated, and that the level of preservation was still high. A minimum number of artifacts were recovered, none directly linked to the war period. Limitations in time and scope of the 2010 season prevented excavation inside the hold, where artifacts of historical significance are likely to survive.

While remote data regarding the full extent of the wreck were acquired, further investigation is required to determine the precise coordinates of the bow and stern for the safe installation of a cofferdam. Additional test units will be required in the 2011 season to ascertain the full outline of the hull, in order to develop engineering plans for the cofferdam installation.

The 2010 season provided a valuable opportunity to identify difficulties specific to the site that will be addressed in future excavation work. The deep overburden covering the wreck was problematic for the dredges employed, and the low visibility slowed data collection. While it was anticipated that the river's current would impede progress, divers were not overly hindered by it, although it did adversely affect some GPS efforts. Through the lessons learned this season, the excavation team can plan more effectively for the 2011 season.

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ACKNOWLEDGEMENTS

This project was accomplished through the hard work and dedication of a large team of contributors both within the NHHC and beyond. UAB would like to acknowledge, in particular, the achievements of Don Shomette and Ralph Eshelman, Ph.D., who first discovered, documented and promoted site 18PR226. Their publications have provided an invaluable base on which to build further research.

The teams from Maryland Historical Trust (MHT) and Maryland State Highway Administration (MD SHA) worked tirelessly in the field to make this project a success. The Project Team is especially grateful to Rick Ervin, Senior Archaeologist for MD SHA, and Troy Nowak, Assistant Underwater Archaeologist for MHT, for their support in the field as well as assistance with GIS data processing and analysis. Dr. Peter Guth of the U.S. Naval Academy provided additional GIS support and was also instrumental in researching the geographic history of the Patuxent River.

The Project Team is indebted to Rick Thiel of SUPSALV whose coordination was pivotal to the logistical success of this project. Additional acknowledgment goes to Bill Clark, District Manager of the Calvert Soil Conservation District, Jeff Morris of Azulmar, and J.B. Pelletier and the URS archaeological team. Maryland-National Capital Parks and Planning Commission (M-NCPPC) provided assistance and use of their facilities as a base of operations. From M-NCPPC, particular thanks go to Don Creveling, Archaeology Program Manager, Mike Lucas, Assistant Archaeology Program Manager, Greg Lewis, Manager of the Patuxent River Park, and Greg Kearns, Patuxent River Park Naturalist. Institute of Maritime History (IMH) volunteers Bill Utley and Ray Hayes provided much needed assistance in the field and in the lab.

Within the NHHC, a special acknowledgement must be given to conservator Kate Morrand, who treated incoming artifacts and took on significant additional duties while fieldwork was ongoing. Hearty thanks are also due to our flotilla of interns, both in the field and in the office, including Janice Nosal, Joe Mazarrieto, Sarah Cahlan, Andrew Leach, Thomas Edmonds, Brian Whitney, and Pooja Datta. Finally, UAB acknowledges the fundamental support of the Commemorations Division of NHHC of this War of 1812 project.

The Project Team also extends thanks and gratitude to the area residents, especially of the Patuxent Mobile Estates and the Wayson's Trailer Court, who permitted us access to their properties, use of their pier and ramp facilities, and allowed us to set up a comfort station on their shore. They endured considerable traffic related to the Project and remained gracious throughout.

1.0 INTRODUCTION

In summer 2010, the Underwater Archaeology Branch (UAB) of the Naval History & Heritage Command (NHHC) and partners engaged in the survey and preliminary archaeological investigation of the shipwreck site 18PR226, believed to be that of USS *Scorpion* (henceforth referred to as *Scorpion*). The ship, built as a gunboat in 1806, was rebuilt and deployed to combat the British threat to Washington D.C. in 1812 (Figure 1). Reassigned in 1814 to the Chesapeake Flotilla, a force hastily assembled by Joshua Barney to combat British raids on the Chesapeake coast, *Scorpion* was scuttled in the Patuxent River to prevent capture by the British during their advance on the capital in August of that year.

The site was discovered in 1979 by Donald Shomette, who dubbed it the "Turtle Shell Wreck." Limited excavations were carried out in 1980 and a number of artifacts were recovered, including a surgeon's kit, a munitions box and carpentry tools , leading to the suspicion that this wreck was the Chesapeake Flotilla flagship *Scorpion*, where it is believed the flotilla's sick bay was located (Shomette 1995:290). A tin-plated grog cup with the initials CW was also found, and may have belonged to Caesar Wentworth, one of the flotilla's cooks. The vessel was reburied with only limited documentation of the hull. As part of the commemoration of the bicentennial of the War of 1812, the UAB developed a plan to locate the site again and conduct a complete investigation of the vessel.

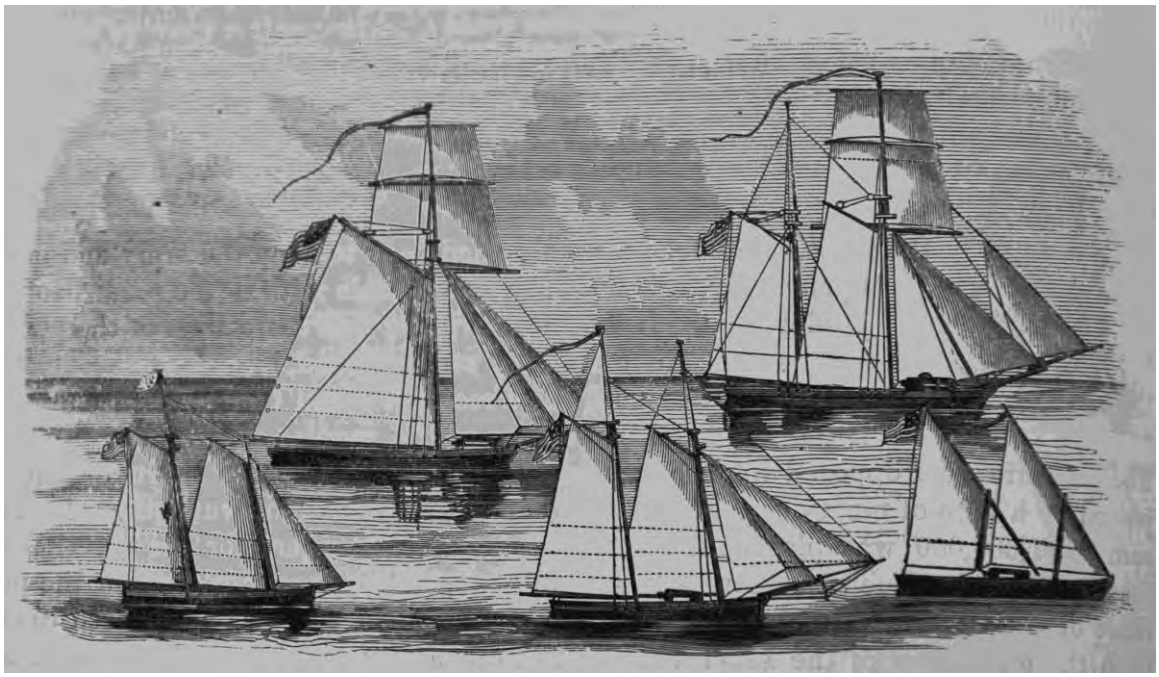

FIGURE 1. A collection of War of 1812 gunboats from Gosport, Virginia (Lossing 1869:168).

The 2010 field season is but one portion of a project envisioned as having two distinct phases. The 2010 and 2011 seasons will take the form of intrusive survey, sampling, and documentation of the wreck site to ascertain its extent, condition, artifact dispersal pattern, and to conduct any engineering studies necessary in preparation for the second phase. In 2013, the second phase will involve a full site excavation through the use of a cofferdam. Extensive artifact removal and documentation of the buried hull will be followed by several years of conservation and study, leading to the final publication of the project in 2017.

1.1 *Objectives*

The overall project has five main objectives. The first is to collect archaeological data through artifact recovery and site mapping. This will include fully documenting, sampling and analyzing the ship and its environment. Since no gunboats survive from this period, this site provides a rare opportunity to study design details and construction methods of American naval constructors of the period. The closest surviving parallel, the Continental gunboat *Philadelphia*, currently housed in the Smithsonian's National Museum of American History, was built nearly 30 years earlier and hastily constructed in a relatively remote region, but may contain many similar features. Two surviving War of 1812 vessels, *Hamilton* and *Scourge*, rest on the bottom of Lake Ontario as a Canadian National Heritage Site. Of these, only *Hamilton* was built in America, and both were built as merchant vessels, making comparison with a gunboat problematic. *Scorpion* provides a rare opportunity to study the output of the experienced Atlantic shipbuilders of an America just beginning to establish its place as an international naval power.

Additionally, this project is intended to preserve, study, interpret, and display the recovered artifacts, attesting to life aboard an early American warship. The project will also provide the media, dignitaries, and the general public a high-profile opportunity to observe the live rediscovery of a U.S. Navy ship that fought in the War of 1812. It is also designed to make Navy history come alive by educating and instilling pride in Navy midshipmen, recruits, sailors, and officers, and raising national and international public awareness of the U.S. Navy's significant past and present. Finally, the *Scorpion* project will commemorate U.S. Navy resilience in the defense of Washington and emphasize Navy's role in the protection of homeland security during wartime.

The data acquired from the 2010 field season is expected to address several research questions. First, through artifacts recovered, it will provide details regarding life of U.S. Navy seamen during the War of 1812. Second, it will shed light on ship construction, war tactics, arming and fitting out of naval war craft of the era. In addition, information regarding bio-corrosion of metals will be collected, allowing conservation treatments through scientific analyses of materials and substances recovered from the wreck. Finally, data gathered may confirm, contradict, or complement the historic record of Barney's fleet and the War of 1812.

1.2 *Partners*

Funding for the U.S. Navy portion of this project was provided through the War of 1812 Commemoration Initiative of the NHHC. Further financial support and personnel were provided through the Maryland Historical Trust (MHT) and the Maryland State Highway Administration (MD SHA). Logistical support and equipment were arranged through the Supervisor of Salvage and Diving (SUPSALV). Research assistance was provided by the U.S. Naval Academy and the Marine Corps History Division. Maryland-National Capital Parks and Planning Commission (M-NCPPC) provided use of their facilities on the Patuxent River as a base of operations. Both the Patuxent Mobile Estates and the Wayson's Trailer Court also generously allowed use of their facilities during the excavation. Volunteers Bill Utley and Ray Hayes of the Institute of Maritime History (IMH) also provided valuable surface support during the excavation.

2.0 HISTORICAL BACKGROUND

2.1 Chesapeake Theater in the War of 1812

By the outbreak of the War of 1812, the British Royal Navy had well over a decade of experience blockading the French-controlled ports of Europe. This method of stifling trade and choking off military supplies had proved successful against Napoleon and other opponents, and was immediately applied to the conflict with America. The Chesapeake Bay, with its access to Norfolk, Baltimore, and Washington, and surrounded by rich, productive farmlands, was an important locus of trade for the United States in this period and a natural choice for a British blockade. The Royal Navy was also seeking to neutralize the threat from American privateers based out of Baltimore, who had preyed quite successfully upon British merchant shipping in 1812 (Crawford 2002:318).

With only a small navy in place at the start of the war, the focus of America's strategy was to press northward by land and capture territory in Canada. As this campaign continued, the British sought ways of dividing and weakening American land forces. In 1813, the British Secretary of State for War and the Colonies, Henry Bathurst, gave orders to send a squadron carrying troops to the American coast "to harass the enemy by different attacks" while avoiding "the risk of a general action" (Bathurst 1813). The strategy was to land troops, take or destroy goods and property, and promptly return to sea, thereby necessitating the diversion of American ground forces for coastal defense. The rich and virtually defenseless Chesapeake Bay was a perfect venue for these British raiding parties.

A British squadron under the command of Rear Admiral George Cockburn was already in place off Norfolk, attempting to destroy U.S. frigate *Constellation*, which was out of reach up the Elizabeth River. This force was soon reinforced for the purpose of launching raiding parties. Restricted somewhat by the shallow, tidal Chesapeake coastline, raids were conducted by the smaller ships of the fleet, often joined by the boats from the larger vessels, which maintained the blockades at river mouths and other strategic deep-water points.

2.2 Joshua Barney and the Chesapeake Flotilla

With the majority of U.S. Naval resources in the Chesapeake deployed in defense of Norfolk and the trapped *Constellation*, and Hampton Roads blockaded by the British, Secretary of the Navy William Jones was left with scant resources with which to defend the Bay. Norfolk was relatively secure, but Annapolis, Baltimore, and Washington were all potential targets for the un-opposed Royal Navy squadrons. In a February 1813 letter, Jones lists the Navy's assets in the Bay as the frigate *Constellation*, 17 gunboats and a cutter, all in Norfolk, leaving 3 gunboats (*Nos*. *70*, *71*, and *137*) and a schooner (*Asp*), still being fitted out, in Washington, with the cutter *Scorpion* on its way from Norfolk (Jones 1813a). He omitted mention of the frigate *Adams*, which had just been converted into a sloop-of-war at Washington Navy Yard, and was soon to be ready for sea, but penned in the Potomac by the blockade. Captain Charles Gordon, in command at

Baltimore, reported on the same date, that he had but one gunboat (*No. 138*) at his station (Gordon 1813). Jones sent the vessels at Washington, along with *Scorpion,* down the Potomac to attempt to stop the shore raids and "confine the depredation of the enemy to the sphere of his ship" (Jones 1813b). This effort met with little success. In April, Gordon was authorized to lease four armed schooners from among the privateers of Baltimore for the defense of that city (Jones 1815c).

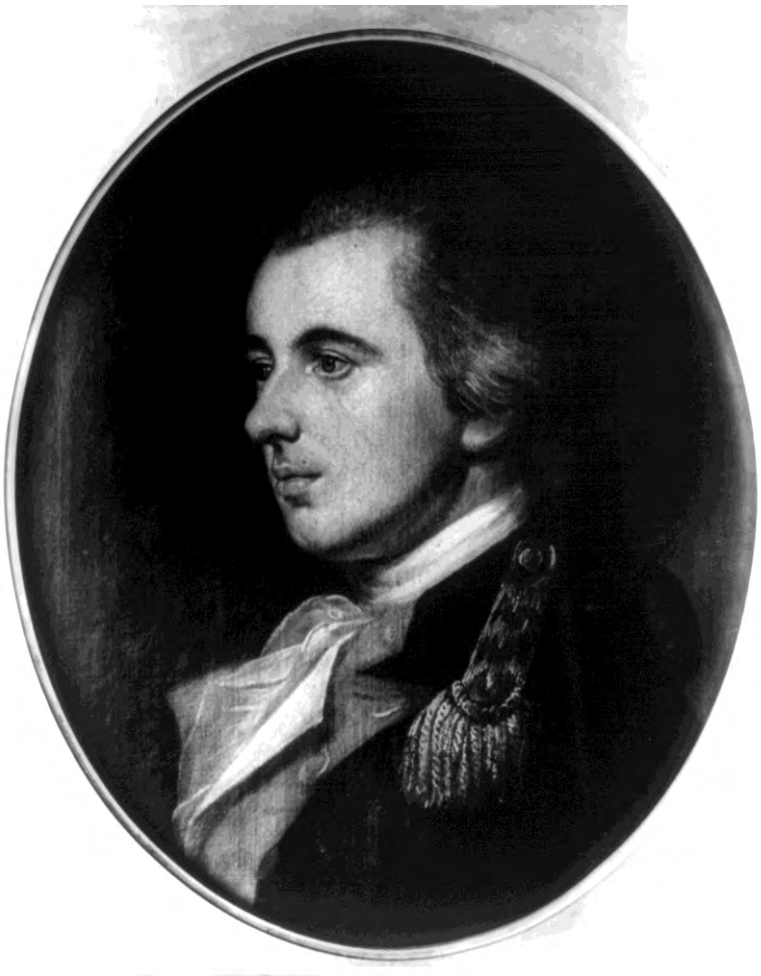

FIGURE 2. Portrait of Joshua Barney by Charles Wilson Peale, ca. 1788 (Library of Congress PPOC, item 2007683563).

Joshua Barney, Baltimore native, businessman, privateer, and seasoned veteran of the Continental and French navies, found himself unable to sit by and watch the enemy raiding go unchecked (Hughes 2004:27-9) (Figure 2). On his own initiative, Barney sent a proposal to the government for the defense of the bay using a flotilla of armed barges. Estimating the Royal Navy force on the North American station as "11 ships of the line, 33 frigates, 38 Sloops of war, and a number of Schooners &c," he calculated an available fighting force of 8200 men (Barney 1813). To combat this, Barney proposed the

construction of a fleet of barges, also called row-galleys, which would be lighter and more maneuverable than the old Jeffersonian gunboats that populated the extant fleet. He envisioned that these boats "might oblige the Enemy to quit our waters, for during the summer months, they could so harass them at Night: by getting near the ships of War, and keeping up a constant fire upon them, when no object would appear as a mark for the enemy, so that little damage could be received, especially as the Barges would be fitted to prevent boarding…." (Barney 1813) (Figure 3). He further recommended having several fast-sailing boats for use as fireships, as well as sinking vessels to block access to Washington and Baltimore and setting up floating gun batteries at these points.

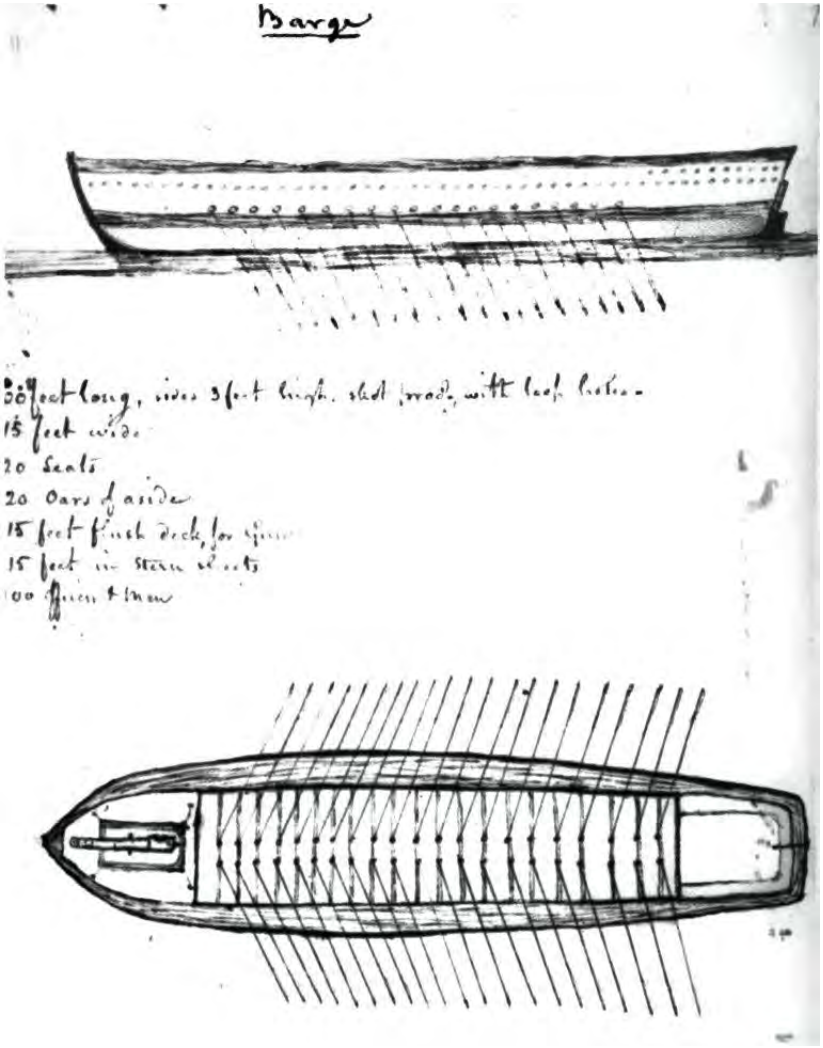

FIGURE 3. Proposed design for barges to defend the Chesapeake Bay. Sketch by Joshua Barney (Barney 1813).

Jones was quick to take advantage of any chance to mount a naval defense for relatively little expense. He authorized Barney's proposed flotilla, appointing Barney himself to command it as a force separate from the U.S. Navy and answerable directly to the

Secretary of the Navy. In preparation over the winter of 1813-4, Barney finally set out from Baltimore on 28 April 1814 with 12 barges, Gunboats *137* and *138*, and the flagship *Scorpion* (Barney 1814b). Also under his command were a lookout boat, the row-galley *Vigilant*, the schooner *Asp*, on its way from the Potomac, and several other barges still under construction in Baltimore.

2.3 USS Scorpion *and the Vessels of the Flotilla*

Constructed in haste, this somewhat motley group of 15 ships was not what Barney intended to be the full force of the flotilla. However, it was deemed sufficient to at least begin the campaign against the Royal Navy. Jones himself was quite optimistic, telling Barney, "Your present force I trust is sufficient to repel all the boats the enemy can muster and I hope to hold his Ships uneasy under certain circumstance" (Jones 1814a).

The main body of the force consisted of seven first-class and four second-class barges, built to Barney's specifications in Baltimore. The first-class vessels were 75 feet (22.86 m) in length with a crew of 50 men, and second-class 50 feet (15.24 m) with a crew of 40 men. A prototype constructed in Washington, dubbed *Black Snake*, reportedly drew 21 inches (0.53 m) of water (Jones 1813d). These vessels were primarily sailed during ordinary travel, but rowed for battle and other maneuvers. Each was fitted out with a long gun in the bow and a carronade in the stern, though calibers varied due to availability, and the need to optimize vessel trim. The full complement of flotilla vessels and guns in the Patuxent with Barney as of 20 June 1814 is listed in Table 1.

TABLE 1

FLOTILLA VESSELS IN THE PATUXENT AS OF 20 JUNE 1814

No.	Type	Long Gun	Carronade	Gunnade
3	1st class barges	24 lb	42 lb	-
4	1st class barges	18 lb	32 lb	-
2	2nd class barges	light 18 lb	24 lb	-
4	2nd class barges	12 lb	24 lb	-
1	Look out boat	-	-	18 lb
1	Galley [*Vigilant*]	-	-	18 lb
1	*Scorpion*	24 lb	12 lb (2)	18 lb
2	Gunboats	*guns removed for use on land*		

Source: Barney 1814f.

Gunboats *Nos. 137* and *138* were built in 1812, part of the series of coastal defense vessels initiated by Jefferson in the previous decade. Such ships were designed for short-

term cruises, close to shore, or in rivers and lakes. Like the barges, the gunboats were shallow-draft, open-decked vessels, which could be both rowed and sailed. However, they were notoriously poor sailers, uncomfortable and unpopular with the men, and were easily imperiled on the open sea. While many use the terms interchangeably, Barney and Jones made a clear distinction between the gunboats and the barges. Gunboat *137*, laden with provisions, sailed so poorly that it was almost lost on their first encounter with the British and Barney was forced to great risk in order to save it (Barney 1814d).

Another gunboat constructed during Jefferson's initial buildup was Gunboat *No. 59*, built by George Hope in Hampton, VA, and ready for service in July 1807 (Tucker 1993:190). After routine service in the ensuing years, the vessel was rebuilt at the Washington Navy Yard (Tucker 1993:190) and renamed *Scorpion* in 1812. Records detailing the nature of the structural renovations have not survived; however, the vessel is subsequently referred to as a cutter, particularly in the correspondence between Jones and Barney, or occasionally a sloop, primarily in British correspondence. Captain Barrie of HMS *Dragon* apparently described *Scorpion* when he stated "one of the Sloops carried a Broad Pendant, and shewed six Ports Of a side" (Barrie 1814).

While stationed at Norfolk in February of 1813, *Scorpion* was recalled by Secretary Jones for service at Annapolis, but while *en route* it was diverted to the Potomac Flotilla (Jones 1813b). It handily escaped an action in the Yeocomico River that claimed its flotillamate *Asp*, which was too slow to escape the British under the wind conditions they were facing (MClintock 1813). In August 1813, Secretary Jones detailed the vessel to Joshua Barney for his flotilla on the Chesapeake Bay, where it served as the flagship (Jones 1813d). After an early action Barney noted that "*Scorpion* worked in well," and never after found cause to complain of its handling, indicating it was a reliable vessel. *Asp* was repaired after being set fire by the British, and assigned to Barney, but it never sailed with the main body of the flotilla.

While Gunboat *137* was intended to hold the supplies and provisions for the flotilla, its leaky nature made it unsuitable for such duty. Therefore, in early June, Barney hired a merchant ship, then under convoy with the flotilla, *Islet*, to act as the flotilla's store ship (Barney 1814d). Belonging William O'Neale and its captain, Robert Taylor, of Washington, it is described by Barney as "a fine vessel, [that] sails well, & will carry 450 barrels." It is routinely referred to as a schooner, but little else is known of the ship's particulars. The row galley, *Vigilant*, was purchased from the city of Baltimore, which had taken steps early in the war to protect itself with a small, municipally-owned flotilla of barges (Shomette 2009: 426, n. 9). Little is known of the lookout boat, although it was presumably small and relatively fast, as it was regularly detached to scout and report back on enemy positions.

Despite Jones's optimistic vision of the flotilla's effectiveness, the reality proved less than ideal. The hasty construction and lack of sufficient time for testing their points of sailing led to several problems early on. On his initial cruise on 17 April 1814, Barney reported that three barges lost their rudder heads and the second-class barges took on "much water," and he was forced to return to Baltimore for repairs (Barney 1814a). He

was forced to install washboards on the second class barges to help keep the water out, lighten the guns, and take everything out of them except 15 rounds of shot (Barney 1814c). Of the gunboats he says they "are both such miserable tools I do not know what to do with them,… they sail so bad, that I am afraid to trust them out of my sight ahead or astern" (Barney 1814c). It is in part due to the poor sailing qualities of these vessels that Barney found his main force bound up in the Patuxent River for the remainder of its brief existence.

2.4 Action in the Patuxent

On 1 June 1814, just north of the mouth of the Potomac, Barney's flotilla encountered two enemy vessels, including the 14-gun schooner *St. Lawrence*. Admiral Cockburn had sent Captain Robert Barrie of the 74-gun frigate *Dragon*, with *St. Lawrence* and a number of smaller vessels, to cruise for Barney's flotilla, and upon spotting it, gave chase (Cockburn 1814a; Barrie 1814). Barney found himself cut off from the Potomac, and due to the sudden development of squally conditions, was forced to try to reach the Patuxent for safety. The Americans opened fire on the British as they rounded Cedar Point into the river, but neither side carried the day. *Dragon* was unable to pursue due to tidal conditions, and Barrie considered his remaining force "too feeble to attack the flotilla" (Barrie 1814). Thus was established a blockade within a blockade, while the British sent for shallow water vessels with which to pursue Barney.

When reinforcements arrived, Barney was forced to retreat into even shallower waters, taking refuge in St. Leonard's Creek, a tributary draining into the eastern bank of the lower Patuxent. There were two engagements there, the first on 10 June, which also ended in a draw. The second, on 25 June, allowed the flotilla to escape the creek, with the aid of a battery established at its mouth. Gunboats *137* and *138* were scuttled during the second action, as there was little hope that they could maneuver fast enough to evade capture. Thus Barney regained access to the main channel of the Patuxent, but still could not reach the Chesapeake proper, as Barrie remained doggedly on station.

While Barney's initial vision of the flotilla as an offensive, harassing force that would push the Royal Navy out of the Chesapeake did not come to fruition, the mere presence of the flotilla did help divert British attention away from other targets in the bay. In late June, Cockburn reported to his superior,

> [the] unexpected accumulation of Force of the Enemy, although I have managed in some degree to cause it to recoil on himself has nevertheless occasioned me much anxiety and difficulty, inasmuch as I found it decidedly impossible to guard at Norfolk the *Constellation* Thirty Gun Vessels Two Privateer Brigs and other Craft said to have been lately armed there, In the Potowmack the Washington Gun Boats, In the Patuxent the new Baltimore Flotilla and to take care of and forward the works of [Tangier] Island (the distance between these Places being Eighty or Ninety Miles) with only this Ship [*Albion*] Two Frigates a Brig and a Schooner (Cockburn 1814b).

This may help explain why there was little action taken against the flotilla during the month of July. Barrie continued to conduct shore raids and gather intelligence in the area, and Barney kept to the shallows of the upper Patuxent, keeping an eye out for opportunities to attack isolated detachments of British ships. Such an opportunity never arose, and Barney was left with few options for action without a sufficient land force to help dislodge the blockade. Jones proposed at one point to have Barney transport the flotilla approximately 8 miles (12.87 km) overland from Queen Anne's Town to the South River, which drains into the Chesapeake north of the Patuxent. Barney agreed it would be possible for the most part, but could not be done in secret, thus the British could easily move their blockage up to the South before the evacuation was complete (Barney 1814g). The plan was subsequently abandoned.

The British squadron, having learned that the region around Washington was poorly defended by land, bided their time while they awaited the arrival of Admiral Cochrane from Bermuda with a considerable number of troops for an offensive. The men, under command of Major General Robert Ross, were taken up the Patuxent and landed at Benedict, Maryland, on 19 August. Their first object was to destroy Barney's flotilla and then proceed to Washington, should conditions be favorable (Dudley 2002:189). The first task proved to be unexpectedly easy.

Upon hearing of the British landing, the leaders in Washington immediately turned their attention to the defense of the capital and other potential targets in the area, particularly Annapolis. Jones, in dire need of seasoned fighters, ordered Barney to bring the majority of his men to Washington, and to send the flotilla as far upriver as possible to evade the British; if that should be impossible, the flotilla was to be destroyed (Jones 1814b). Leaving Lt. Solomon Frazier with 120 men, including the sick and wounded, with the flotilla, Barney left for Upper Marlboro with approximately 400 men (Barney 1814h). When the British fleet approached the flotilla just north of Pig Point on 21 August, Frazier was ready and the flotilla vessels exploded in the channel. Cockburn reported 16 of the 17 ships were destroyed; the surviving one was captured, along with 13 merchant schooners sheltering with them (Cockburn 1814c).

2.5 The Battle of Bladensburg

Jones placed under Barney's command a detachment of marines under Captain Samuel Miller, along with three 12-pound long guns and two 18-pound light long guns (Jones 1814b). Encountering the American forces under General William Winder on the road to Washington, Barney's contingent with its heavy artillery was sent back to the city on 23 August. The next morning, as the British approached from the north, Barney was ordered to use his artillery to defend the bridge over the Eastern Branch (now the Anacostia). Ever a man of action, and knowing this task required only a minimal force, Barney secured orders from the President to take his men and artillery to join the action at Bladensburg. Arriving just as the battle was ready to commence, he set the artillery on rising ground to defend the road into Washington (Barney1814i) (Figure 4). The

seasoned British soldiers soon put to flight many of the inexperienced militia troops defending the city, but Barney and his men held firm until their ammunition was expended and they were outflanked. Barney himself had his horse shot out from under him and was wounded in the thigh. He finally ordered his men to retreat while he remained in the field to be captured by the British. He was treated with honor and respect by the British officers, and granted parole. Captain Miller was also wounded, two flotillamen were killed and another wounded. The remaining flotillamen were sent back to Baltimore where they helped man the guns in defense of the city during the British barrage of Fort McHenry on 13–14 September 1814.

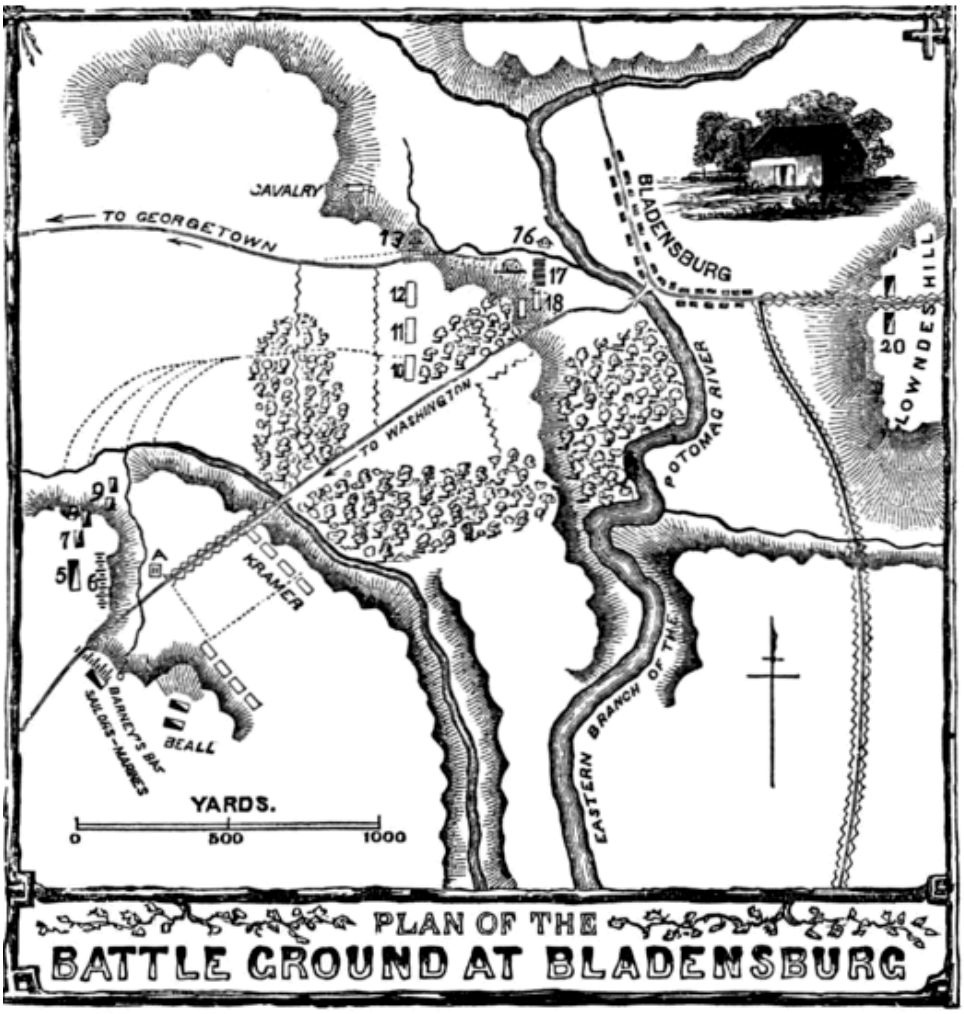

FIGURE 4. Plan of the Battle of Bladensburg. The position of Barney and his artillery is marked in the bottom left (Lossing 1869:929).

3.0 SITE LOCATION AND ENVIRONMENTAL SETTING

3.1 Site Location

The site of the suspected War of 1812 vessel *Scorpion* is located in the Patuxent River in Prince George's County, Maryland, on the immediate border with Anne Arundel County (Figure 5). The site is 4.02 km (2.5 mi) east of Upper Marlboro and north of the MD Route 4 Hills Bridge, in the vicinity of Wayson's Corner in Greater Upper Marlboro. The research area is flanked by the Patuxent Mobile Estates to the east-northeast, Maryland-National Capital Parks and Planning Commission (M-NCPPC) park land to the northwest, west, and southwest, and Wayson's Trailer Court to the south.

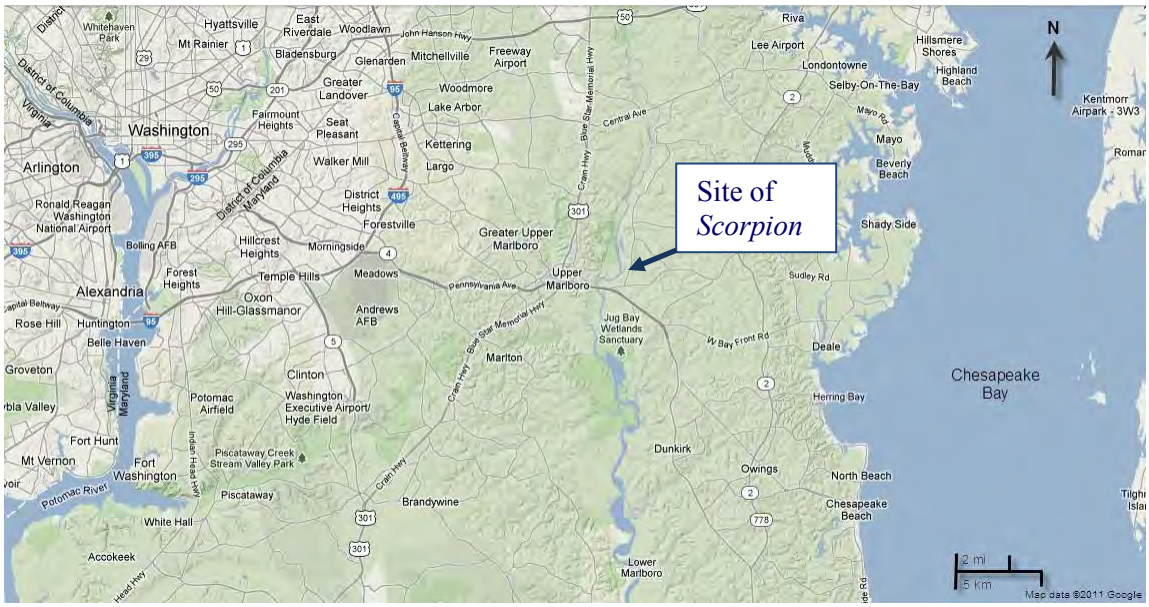

FIGURE 5. Map of south central Maryland showing the location of the *Scorpion* shipwreck (Map data © Google 2011).

Within the river, the site is relatively close to the northern/western bank in a moderately wooded wetland environment (Figure 6). The distance from the hull remains to the shoreline ranges from approximately 7.5 m (upriver) to 10 m (downriver), and extends 12.2 m into the channel of the river. The nearby bank rises approximately 1.5 m up from the water's surface and is lined with trees and brush native to the area. Designated as one of Maryland's most scenic rivers, the northern/western shore area itself is part of the larger Patuxent River Park system maintained by the M-NCPPC.

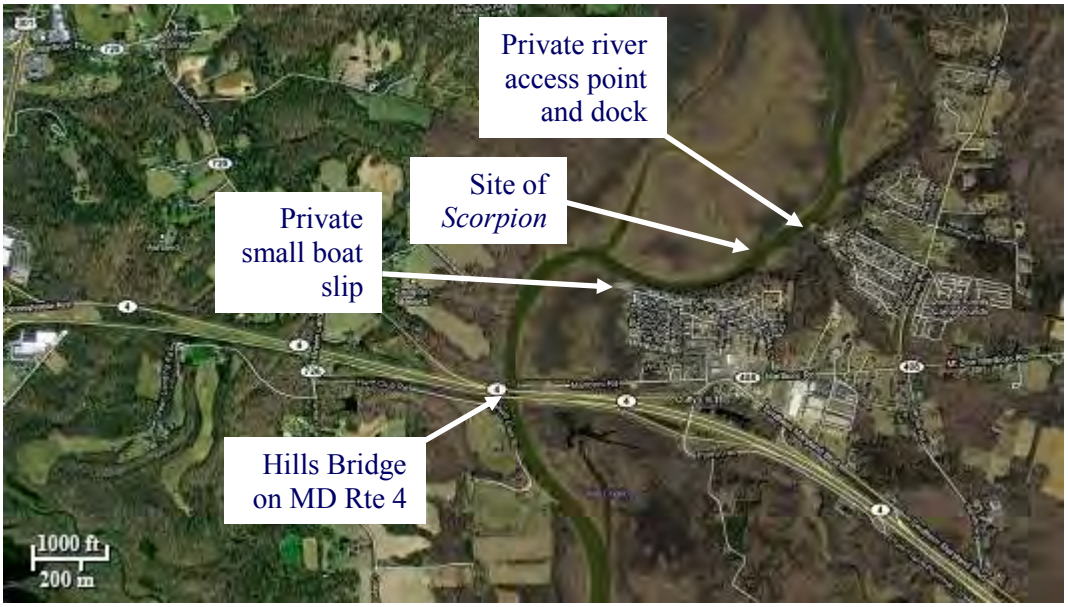

FIGURE 6. Satellite view of Wayson's Corner and location of the *Scorpion* shipwreck (Satellite image © Google 2011).

The Patuxent watershed drains an area of approximately 960 square miles (2,486 km^2). The head of the tide is at Queen Anne's Town, 84 km above the mouth of the river, and several kilometers upriver of site 18PR226, although at one time it reportedly reached the fall line near Laurel, at the northern boundary of Prince George's County (Newell 1911:207). The mean tidal range at Hills Bridge, immediately downstream from the site, is 2.4 ft (.73 m) (NOAA 2005).

The river is skirted by tidal marshland through much of its course through the estuary. Its lower course moves over unconsolidated sediment, with low banks which can be inundated in times of high water (Little 1917:53). It was never an important river for water power, although a number of successful mills operated in Laurel in the 19th century (Newell 1911:207-8). A steamboat line regularly traveled to Queen Anne's Town until the early 20th century.

Within the vicinity of the archaeological site, there are four primary soil types present. To the north and west, in the area of the M-NCPPC nature preserve, Nanticoke and Mannington soils (tidally flooded- silt loam) are found. Upriver, northeast of the site near the Patuxent Mobile Estates, Mispillion and Transquaking soils, 0 to 1 percent slopes (tidally flooded- silty clay loam) are observed. Evesboro-Galestown-Urban land complex, 0 to 5 percent slopes (loamy sand) can be found south of site near Wayson's Trailer Court. Finally, the last type of soil nearby is Galestown loamy sand, 0 to 5 percent slopes located southwest of site. (NRCS 2011)

3.2 Environmental Conditions

The USS *Scorpion* archaeological site is situated in the freshwater tidal zone of the lower Patuxent River (Figure 7). The hull remains are completely submerged in semi-shallow water, with levels ranging from 1.8 to 2.4 m depending on tidal condition. Heavy rains and storm events can periodically raise water levels along this stretch of the river. Additionally, the T. Howard Duckett Dam is located approximately 43.5 km upstream from the site and, depending on discharge, can also increase both depth and flow in the region.

FIGURE 7. The site of *Scorpion* and its surrounding wetlands. (Image © Microsoft Corporation. Pictometry Bird's Eye © 2010 Pictometry International Corp., © 2010 NAVTEQ).

Archaeologists from the NHHC collected flow rate data from the river in early July at and near the site of field excavations. Data was collected using a Global Water Flow Probe (FP111) both on the surface and 1 m below the surface. On average, the rate recorded was from 0.0 to 0.2 m/s as the tide flowed, and from 0.2 to 0.5 m/s as it ebbed. The maximum current observed was 0.5 m/s, or 1 knot.

Summer water temperatures in the Patuxent River range from temperate to warm depending on seasonal trends and weather patterns. On average, water temperatures during the months of July and August fluctuate between 23.9 and 28 ºC. As with both depth and flow, heavy precipitation or storms can temporarily lower temperatures by a few degrees as colder runoff water is introduced into the river.

Diving conditions in the Wayson's Corner area of the Patuxent River can be moderate to challenging depending on the circumstances. Both fluvial and tidal forces result in high

turbidity zones, reducing visibility from 20 to 45 cm with a mean visibility of 31 cm. As previously stated, both temperature and flow rate can change daily and greatly affect diving conditions, especially the current.

3.3 *Changes in the Patuxent River Course near the* Scorpion *Wreck Site*

In an effort to establish the historical course of the Patuxent River and understand the post-depositional processes that have affected the site, the U.S. Naval Academy and NHHC established a Geographic Information System based on studied maps of the Patuxent from the War of 1812 to present day.

Although early maps, especially those published prior to 1878, were often inaccurate, examination and geo-referencing of a number of historical maps has provided clues that between the late 1800s and 1930s a prominent eastern bend formed in the area that holds the probable *Scorpion* wreck (Figure 8). This significantly affects the interpretation of the wreck and the historical accounts describing the location of the flotilla at the time of its sinking.

FIGURE 8. Current Patuxent River course with main channel bending eastward (Satellite image © 2011 Commonwealth of Virginia, Digital Globe, GeoEye, U.S. Geological Survey, USFA Farm Service Agency).

An aerial photograph shows that the modern river course was present at least by 1938 (Figure 9).

FIGURE 9. Aerial photograph of the Patuxent River near Upper Marlboro, MD, 1938, showing new path of the main channel (Photograph No. AHV4-59). (CSCD 2009:Appx. 2).

A USGS topographic map from 1905, based on survey data from 1890, shows a much straighter course above Hills Bridge, with the main channel running roughly northwards along the west bank of the riverbed (Figure 10).

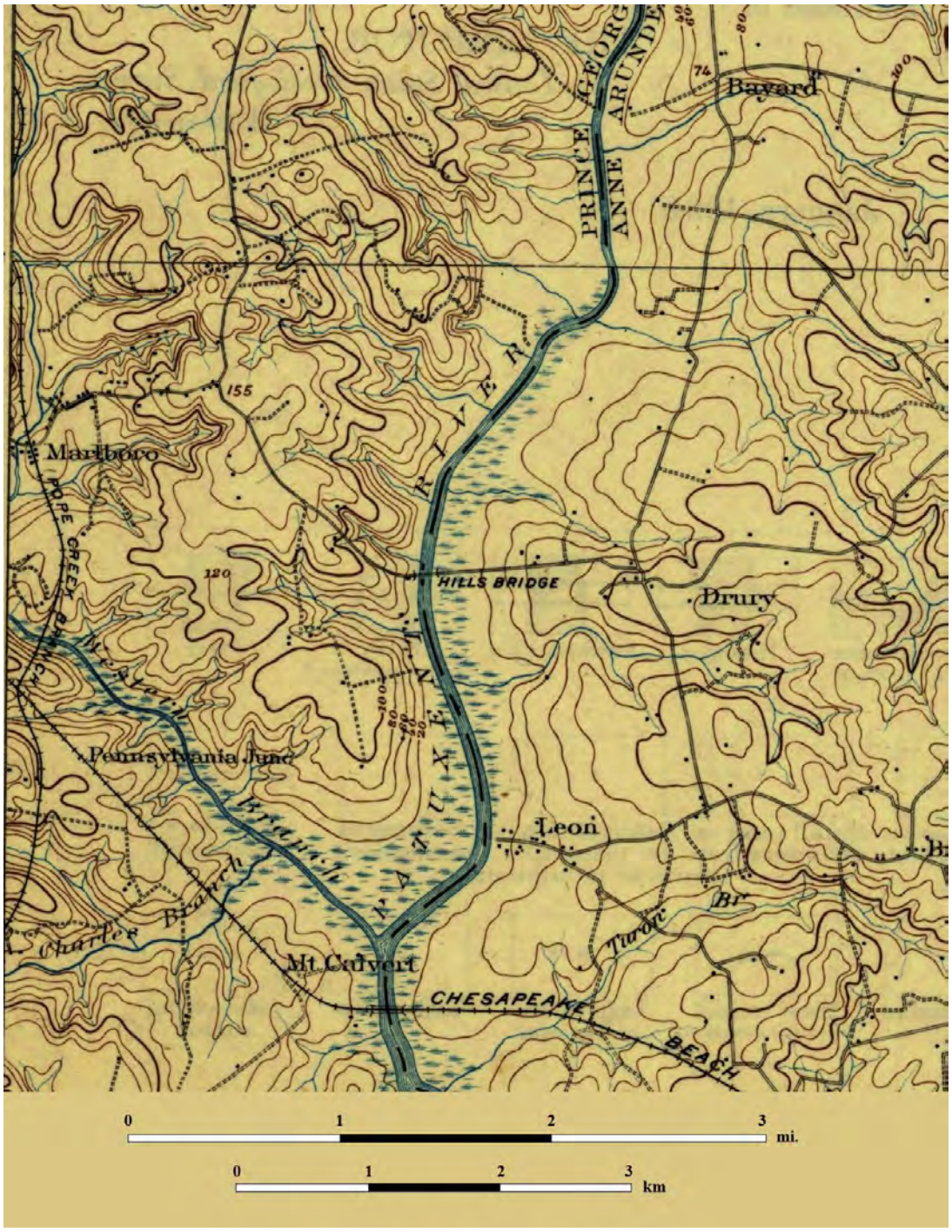

FIGURE 10. Detail of a 1905 USGS topographic map, showing the main channel of the Patuxent River north of Hills Bridge running primarily along the west bank (USGS 1905).

Thus it appears the most significant change in the river's course in the area took place during the early 20th century. The natural evolution of the course of the Patuxent River is a result of several factors, including hurricanes, floods, and prolonged sedimentation buildup due to increased land use upstream. The path of a river channel is determined in large part by water flow and sediment deposition. Rivers can reach a state of equilibrium in which the general shape and dimensions remain relatively unchanged over several decades or even a century. Flooding, which causes massive erosion and sediment movement in a short amount of time, can greatly affect the channel's stability, resulting in short-term widening and/or narrowing of the river. The Gale of 1878, the Chesapeake-Potomac Hurricane of 1933, and the Great Spring Flood of 1936 all caused major flooding along the Patuxent in the period when the course appears to have changed (NOAA 2010). Long-term changes in rivers of the eastern United States are generally related to consistent alterations in water flow and sediment supply of the watershed as a whole, which often result from changes in land use, including agriculture, mining, and urban construction (Smith et al. 2003:35-6). It is likely that no stream networks in the Chesapeake Bay area have achieved equilibrium since European colonization (Smith et al. 2003:36).

Sedimentation buildup became a significant issue along the Patuxent in the mid 1800s. In a study by Brush and Davis (1981), sediment cores were collected from three locations in the Chesapeake Bay watershed to study changes in diatom and submerged macrophyte populations, which can reflect the environmental impact of post-settlement land use. Nine cores taken from three locations in the Patuxent River revealed a substantial increase in sediment accumulation over two distinct periods of time: early European settlement (ca. 1650-1840) and intensive agriculture (ca. 1840-1980), when over 40% of the land was cleared. Sedimentation accumulation near the *Scorpion* site more than doubled from the time of early settlement to the intensive agricultural period (TABLE 1) (Brush and Davis 1981:10-14).

TABLE 2

AVERAGE RATES OF SEDIMENT ACCUMULATION IN THE PATUXENT RIVER

	ca. 1650-1840*	ca. 1840-1960	Increase
Jug Bay	0.16 ± 0.02 cm/y	0.41 ± 0.03 cm/y	156%
Eagle Harbor	0.22 ± 0.02 cm/y	0.51 ± 0.06 cm/y	132%
St. Leonard's Creek	0.10 ± 0.009 cm/y	0.34 ± 0.03 cm/y	240%

Source: Brush and Davis (1981:10-14)
* The pre-settlement rate was estimated at 0.1 cm/y for all three sites.

Silting of the channels caused serious navigation problems for steamboats that traveled up the river by the 1880s (Shomette 1995). Hills Landing, not far down river from the wreck site, was abandoned in 1885 when sediment filled the main channel and made it

impossible to navigate. The U.S. Army Corps of Engineers attempted to dredge the area but could not keep up with the rate of sedimentation buildup (Shomette 1995:105-110).

Historic Maps

Most maps prior to 1905 illustrate only a slight bend in the Patuxent north of Pig Point, in the area where Barney reportedly scuttled the flotilla. Inaccuracies are not uncommon in 19th century cartography, so it can be difficult to judge a map's utility. Several factors may affect the various depictions of the Patuxent river course in the surviving maps. Aside from the simple errors in collecting and compiling the original data, there was also the practice of copying older maps rather than re-surveying the land, leaving room for copying errors to creep in and be perpetuated or even exaggerated. In addition, many maps covered an entire state or multi-state region, thus the level of detail about specific turns and bends in a small stretch of river is often low. Finally, since the Patuxent is heavily skirted by marshlands, some maps may conflate navigable river channel with marshland within the greater riverbed, recognizing only the difference between solid land and water-based areas. All three of these factors may affect the maps in Figures 11 and 12, which show a relatively wide and straight course for the river in the mid-19th century.

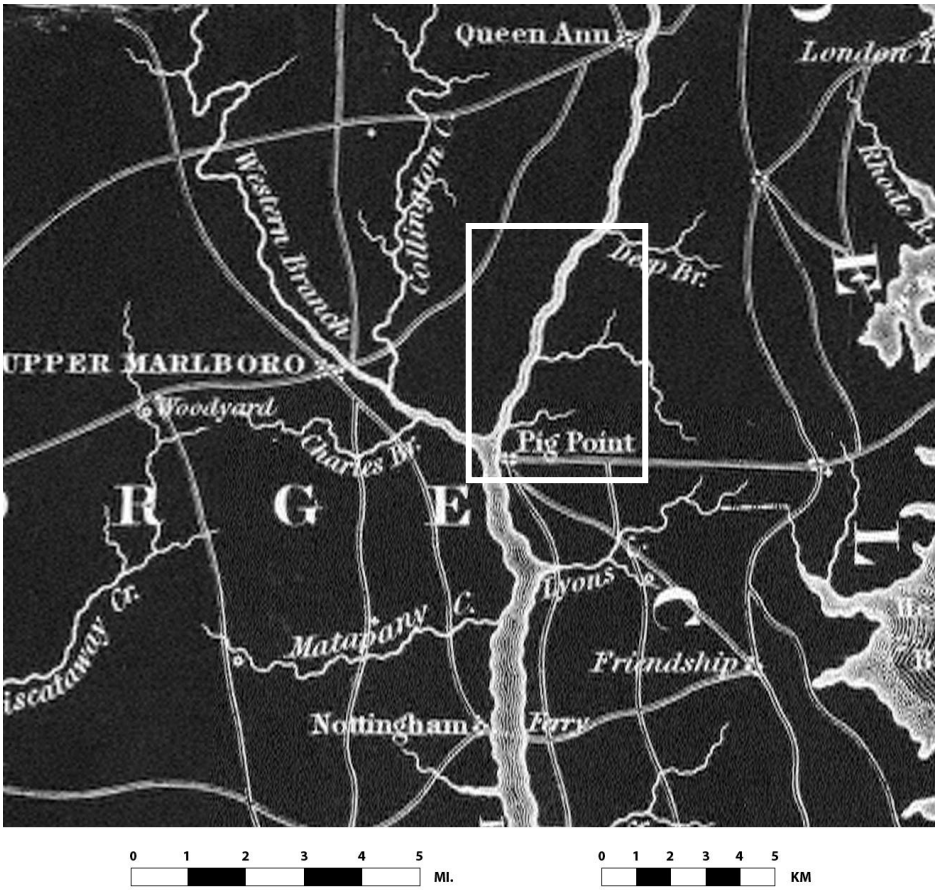

FIGURE 11. Detail of an 1840 nautical chart of Maryland (NOAA 1840).

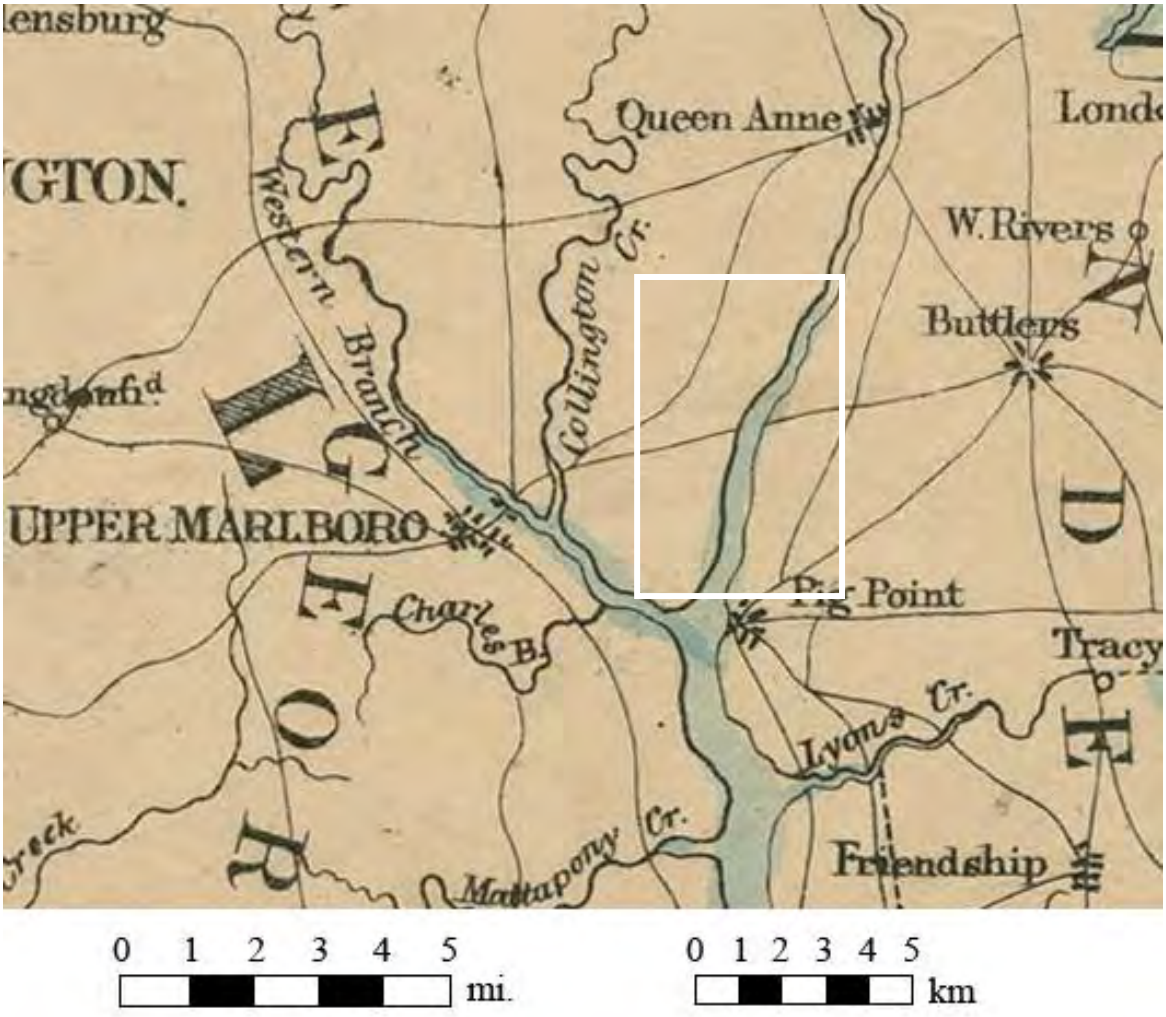

FIGURE 12. Detail of an 1863 map of Maryland (NOAA 1863).

A map from 1878, however, shows a split in the channel just above Hills Landing, roughly in the vicinity of the current wreck (Figure 13). Taken from an atlas of Prince George's county, the resolution, down to location of individual homes, is high. This map is more likely to reflect logistics of travel, and thus the presence of dual channels would be useful to note for those on the water. The resulting island, however, seems somewhat large, particularly since it does not show up on any other map, and thus may reflect an exaggerated size for emphasis. It might, however, represent the initial phase of the formation of the modern eastern bend.

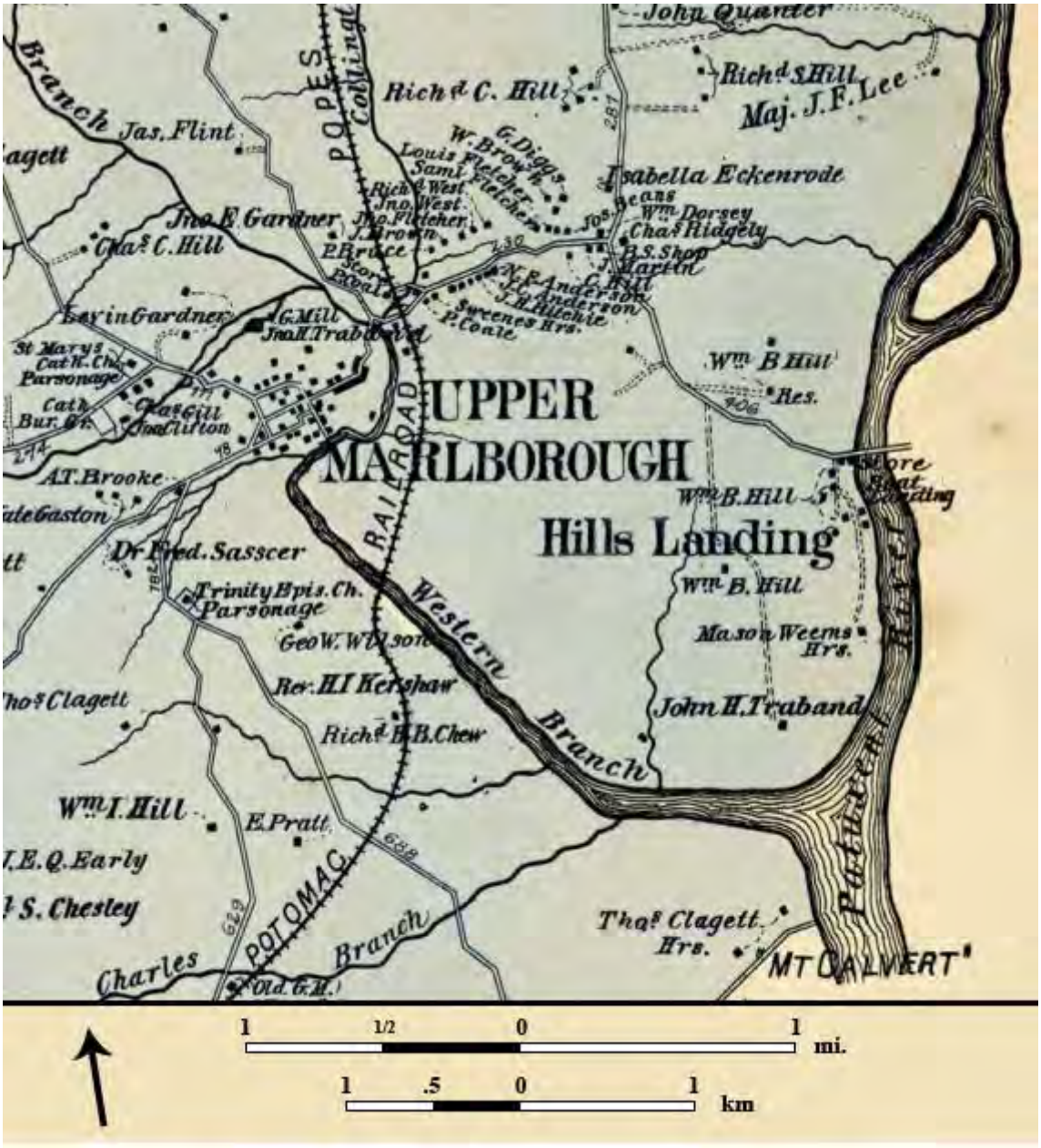

FIGURE 13. Detail of the 1878 map *Upper Marlboro. Dist. 3*, showing two distinct channels north of Hills Bridge (Hopkins 1878).

The most reliable eyewitness description of the river north of Pig Point at the time of the Chesapeake Flotilla's occupancy comes from a description by William Barney, sent by Commodore Barney to sound the river up to Queen Anne's Town, to determine the feasibility of moving the fleet overland to South River. His report states: "the river varies in its width– above pig point and to within one mile of Queen Anns it is narrow, not exceeding in some places 80 to 100 yards, its channel frequently crossing from side to side, for the last Mile it is quite narrow and very winding and no where wider than to admit more than One barge to row up at a time, as far as the Bridge at the town" (Barney 1814g). His description of the channel crossing back and forth across the riverbed

reinforces the idea that many maps depicted the riverbed itself, rather than just the navigable portion of open water.

An 1818 British map of the region showing Major General Ross's advance on Washington, appears to differentiate between the two (Figure 14). The snake-like bends of the river between Nottingham and Mt. Pleasant are quite at odds with the relatively straight path seen in the 1840 map (above, Figure 11). Shaded areas to the west of the channel seem to depict the boundaries of the riverbed, and are more consistent with the later 19th century maps.

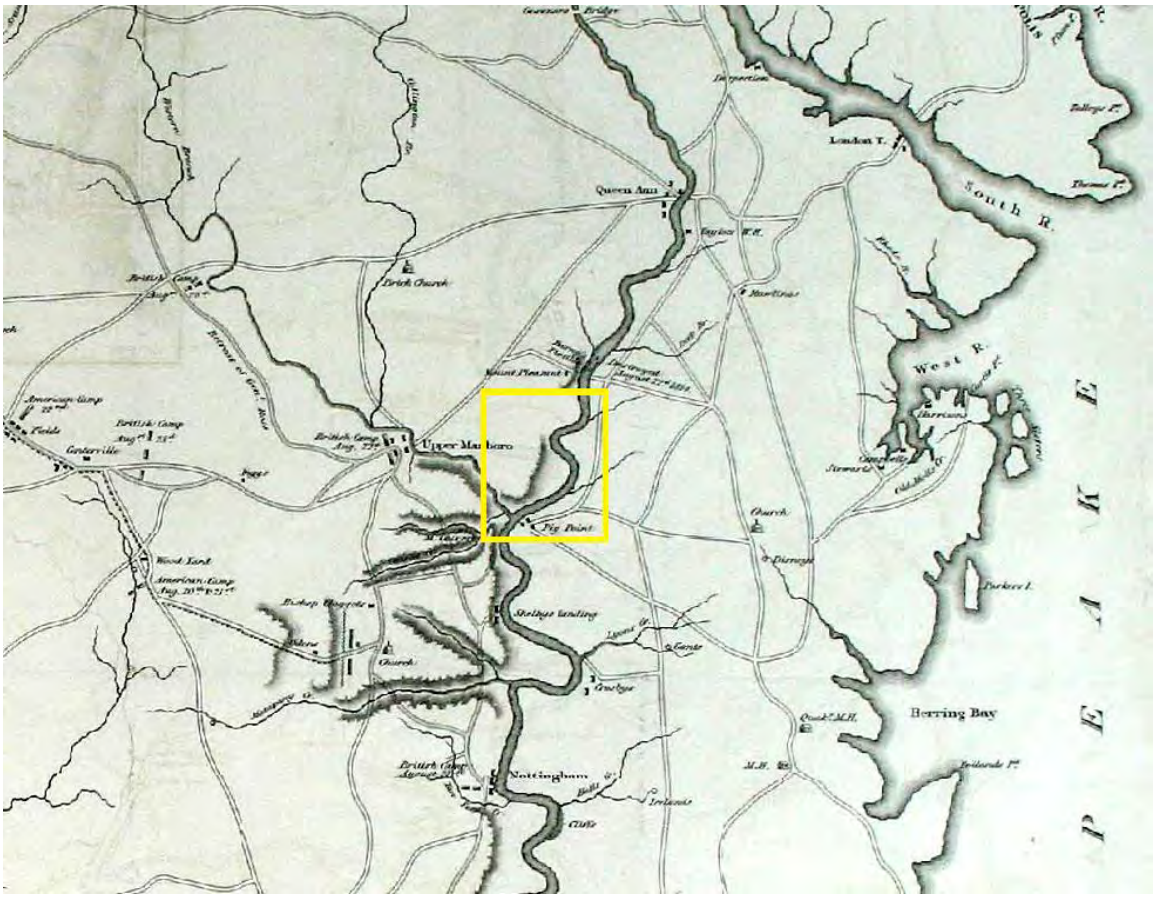

FIGURE 14. 1816 map of Maj. Gen. Ross's route from the Patuxent to Washington, DC. (CSCD 2009:Appx. 3).

In the 1818 map, the channel turns northeasterly directly above Pig Point, which is consistent with the path depicted in the 1905 USGS map (above, Figure 10). It then turns back to the west bank in the vicinity of Hills Landing, which is about level with the town of Upper Marlborough. The channel then turns rather sharply back to the east, though without a divided channel shown in the 1878 map (above, Figure 13), where it intersects with a stream coming in from the east, before turning northward. This is not consistent with the 1905 course which depicts a more gentle northeasterly turn of the riverbed as a

whole, with the channel remaining along the western bank. Certainly there are many problems with this map, and it was not generated as a navigational aide, but rather to outline troop movements prior to the Battle of Bladensburg. As such, its accuracy is suspect in many regards. However, it does help to show the winding nature of the navigable channel within the river bed, and suggests the possibility of minor changes in course prior to the sedimentation of the early 20th century. While the path of the Patuxent River over the *Scorpion* site has remained mostly unchanged since 1938, this may not accurately reflect 19th century condition. The recent relative stability of the Patuxent may be due partially to the State of Maryland passing the Patuxent River Watershed Act of 1961 in order to protect the river by way of "flood prevention, land conservation, erosion control and protection from urban overdevelopment" (Prince George's County 2010).

The Flotilla's Resting Place

Overlaying the modern river course over the 1905 topographic map, the 20th-century changes become even more apparent (Figure 15). It seems too difficult to explain how a War of 1812 ship should have come to rest so far from the historic main channel.

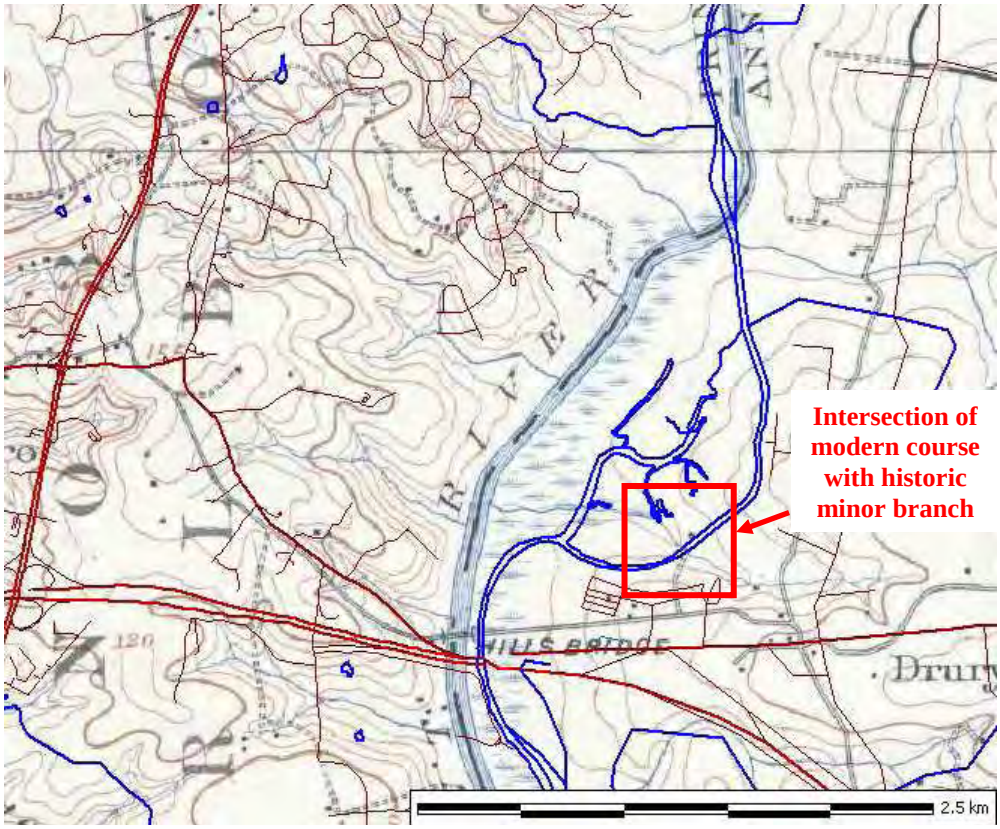

FIGURE 15. Modern Patuxent River contours superimposed on the 1905 topographic map of the area with intersection of minor branch (USGS 1905).

A minor stream, just above Hills Bridge can be seen in several of the maps (Figures 10, 11, 14), heading from the east into the main river and its path crossing the path of the current course of the Patuxent River, in what appears to be the location of site 18PR226, and intersecting with the historic western channel. If investigations support the tentative identity of *Scorpion*, this suggests that the Chesapeake Flotilla was scuttled within this branch, and not the main river, and that additional vessels of the fleet may be in what currently is marshland, either west or east of today's river course. However, MHT, in conjunction with the Calvert Soil Conservation District and the U.S. Department of Agriculture, undertook ground penetrating radar and electromagnetic induction studies of the marshland area adjacent to the wreck site in January, 1999. No significant targets or anomalies were located within a 1000 x 1350 m grid. If the ship was one of the merchant vessels harboring with the fleet, it may have taken shelter up the minor offshoot in hopes of avoiding capture by the British.

Another possibility is that the dual channel depicted in the 1878 map reflects true navigational conditions in the early 19th century, but was not a significant feature by the end of the century when the 1905 map was being drawn. Movement of sedimentation by flood or annual buildup could have cut off flow through the western channel, which roughly corresponds with the modern Back Channel, leaving only the eastern channel navigable. Extensive surveys above and below site 18PR 226, however, have revealed no further wrecks in the modern channel, suggesting that if there were two channels, this ship alone took the eastern route, while the main body of the flotilla was in the western channel.

4.0 PREVIOUS INVESTIGATIONS

4.1 Salvage Operations (1814)

Scavenging of equipment and supplies from the lost vessels by Patuxent residents commenced quickly upon British withdrawal from the area. A local man, Joshua Weems, contacted the Government in early September 1814 about the looting and offered to collect as much as he could on the government's behalf, in expectation of receiving compensation for his efforts (Weems 1814a). He noted that *Scorpion* and the supply vessel *Islet* were both recoverable and quite valuable, but could not be raised without the assistance of a pair of vessels (Weems 1814b). This aide was never provided and the Navy took over salvage operations in November.

At this time, a group of Barney's flotillamen was sent to the area to work on recovering what remained. Barney notified Secretary Jones on 17 November that they had "been very successful in getting up the guns of the late flotilla, with a very considerable quantity of other valuable articles" (Barney 1814j). He later detailed the work done, saying his men "saved out of the River, all Guns, Gun carriages, Cambooses, Anchors, Cables, Shot, &c." (Barney 1815a). There is, however, no record of which items came from which vessel. Further work was conducted in April 1815 as part of the dissolution and final accounting of the flotilla. At least two loads of iron ballast were recovered, and Barney reports that on 5 April, "*Asp* & Gunboat returned, having brought every thing except the Guns & a few shot" (Barney 1815b). Crowninshield confirmed receipt of Barney's accounting but this document does not survive (Crowninshield 1815; Crawford 2002:537, n. 1). No further official salvage efforts were recorded, although a claim for compensation for the loss of the *Islet* was finally settled in 1816 (Shomette 2009:352). The impact of these recovery efforts on the condition of the wreck at site 18PR226 is not yet known, but some signs of this activity will likely be found during more extensive excavation.

Brief references to the flotilla wrecks appear in local records from the late 19th through the mid-20th century, with some reportedly exposed to open air, and others encountered during dredging operations. Interviews conducted with local residents revealed that the community interacted with some of the wrecks, fishing or swimming near them, in the early 20th century, but increased silting from upstream covered most of these sites by mid-century. (Shomette 2009:535-4).

4.2 Discovery and First Investigations (1978-1980)

In 1978, Donald Shomette, director of Nautical Archaeological Associates, proposed a joint venture with the Calvert Marine Museum of Solomons, Maryland, to conduct an underwater archaeological survey of the entire Patuxent River (Shomette 1996a:44-50).

Funded in part by a matching grant from the U.S. Department of the Interior's Heritage Conservation and Recreation Service, administered by the MHT, the team surveyed the

Wayson's Corner area on the upper reaches of the river during June 1979. One site, identified site by an initial magnetometer survey, proved to be wooden timbers fastened with iron spikes (Shomette 1995, 203). The divers found no artifacts during this first exploration except a broken turtle shell. Returning the following June to the site, now dubbed the Turtle Shell Wreck (1-TSW), the diving team discovered a submerged vessel and, in the ensuing partial excavation, uncovered many well-preserved artifacts dating to the late eighteenth and early nineteenth centuries (Figure 16).

FIGURE 16. Artifacts recovered from the 1980 archaeological survey of the *Scorpion* site. (Courtesy of the Navy Museum, Naval History and Heritage Command)

These mainly comprised six categories: surgical and dental instruments, military hardware, carpentry tools, domestic shipboard articles, maritime artifacts, and naval architectural features. The project directors used historical and archival resources to determine that this ship was either from the flotilla or one of the merchant vessels seeking its protection. Not all the evidence is conclusive, but this team tentatively identified the vessel as Barney's flagship, *Scorpion*.

This identification was primarily based on the presence of the surgeon's kit, the carpentry tools, military implements and a grog cup with the initials CW scratched into it. While one of the flotilla's two gunboats (*137* or *138*) was originally fitted out to serve as hospital facilities, both vessels had been scuttled in June, 1814 (Shomette 1995:251). The likeliest candidate for the relocated hospital was the flagship *Scorpion*, which offered

adequate space and protection for the wounded, but was not often in the front line in military engagements, presumably due its limited maneuverability in tight quarters [e.g. Barney 1814e). The carpentry tools may point to Charles Fleming, the only carpenter on the flotilla's muster rolls, who was appointed to *Scorpion* April, 1812 and remained with the ship during its flotilla service (Shomette 1995: 253). The presence of military equipment, such as a munitions box, a gunner's pick and musket flints further confirmed for the investigators that this was a military vessel and not one of the merchant ships harboring with the flotilla. A tin-plated grog cup with the initials CW scratched into the side was also found at the site, and has been attributed to cook Caesar Wentworth, the only registered flotillaman with those initials. The presence of well-finished decorative molding seemed to at least preclude the vessel from being one of the rapidly-assembled barges (Shomette 1995:264-5).

The excavation spurred the state of Maryland to build a conservation lab at the Jefferson Patterson Park and Museum in St. Leonard to preserve the artifacts found at the site. These items are on display at UAB, the National Museum of the U.S. Navy, and the Calvert Marine Museum.

4.3 Remote Sensing Surveys and St. Leonard's Creek Excavation (1995-1999)

In 1995 the Maryland Historical Trust contracted with Donald Shomette to organize the Chesapeake Flotilla Project to search for the remaining vessels of Joshua Barney's flotilla. The search concentrated on two distinct areas, the upper reaches of St. Leonard's Creek, where documentary evidence indicated that two of Barney's gunboats, Gunboats *No. 137* and *No. 138*, had been scuttled, and the so-called Hills Bridge Transect, the stretch of river above Pig Point where the flotilla was reported scuttled and where the *Scorpion* site is located (Figure 17). A series of survey and research projects were thus implemented that continued through 1999.

FIGURE 17. Map of the Patuxent River, MD, showing locations of the St. Leonard's Creek (SLCT) and Hills Bridge (HBT) Transects. (Map data © Microsoft 2011) .

In April, 1996, Maryland Maritime Archaeology Program (MMAP) of the MHT, with support from MAHS, investigated both areas using magnetometry and side-scan sonar. The team utilized an EG&G dual frequency 100-500 Khz side-scan sonar unit and a Barringer M-234 Magnetometer, provided by MMAP, in conjunction with a Northstar 941XD global positioning system and a Loran system. This survey in the Hills Bridge Transect was aimed at locating potential additional wreck sites in the river as well as relocating the *Scorpion* site. Of the 33 magnetic anomalies and 7 additional side-scan targets, 21 were deemed significant. Fourteen of these were investigated by divers, but none showed evidence of being a shipwreck. Shomette noted that the *Scorpion* site did not produce a signature in either the magnetometer or side-scan surveys (Shomette 1996b:47). The depth of the wreck below the riverbed, approximately 1.5 m (5 ft.) during the 1980 excavation, left no significant features appearing at riverbed level for

side-scan to pick up (Figure 18). The fact that it did not register on the magnetometer was problematic, as the site was originally discovered using that method. In St. Leonard's Creek, the survey team located the remains of one vessel, with a possible second nearby, but could not determine at the time if they were connected to Barney's flotilla.

FIGURE 18. Side-scan sonar image of the *Scorpion* site produced during the April 1996 remote-sensing survey. It has since been determined that the bow is to the north and the stern to the south. (Shomette 1996b:28)

In November, 1996, further survey work was carried out in the Hills Bridge Transect, using magnetometry, side-scan sonar and ground penetrating radar (GPR). The team included members from MMAP (MHT), MAHS, Patuxent River Park, and Marine Sonic Technology, Ltd., along with Dr. Neyland as an observer for the U.S. Navy. The side-scan unit, provided by Marine Sonic Technology, was a Sea Scan PC. MMAP's Barringer M-234 magnetometer was once again used. The survey concentrated on the region between Hills Bridge and Mount Pleasant Landing as the most likely area to contain wrecks from Barney's Flotilla. Side-scan sonar produced no likely targets. While a number of magnetometer targets were promising, GPR investigation showed only one, the *Scorpion* site (listed in the survey as WP-100), to be consistent with a shipwreck. [Shomette 1998:52-3] Further work was also done in St. Leonard's Creek as part of this survey, during which the extremities of the first vessel located in April (dubbed Vessel A) were determined. [Shomette 1998:10-11]

In July 1997, an extensive hydroprobe survey was conducted along the Hills Bridge Transect, with team members and support provided by Eastern Carolina University (ECU), MMAP (MHT), Patuxent River Park, Calvert Soil Conservation District (CSCD), Eldon Volkmer and Associates (EVA), and MAHS. The probe was 1.91 cm (.75 in.) in diameter with a maximum depth of 6.10 m (20 ft.). A total of 76 corridors, each 45.72 x

15.24 m (150 x 50 ft.), were surveyed in grid formation, for a final total of 5700 points taken. Aside from the known *Scorpion* site, no further evidence of cultural remains was found. A detailed hydroprobe investigation of the *Scorpion* site was undertaken after the completion of this survey, in order to ascertain the overall extent of the site. They determined the wreck was 22.86 m (75 ft.) long, 11.28 m (37 ft.) wide, and oriented on a near north-south axis, with a surviving deck on both sides. At that time the wreck was 0.76–1.22 m (2.5–4 ft.) below the riverbed at deck level, and at least 8 ft. in the hold area (Shomette 1998, 55-6).

After the project research team undertook a review of historic maps and documents in August 1997, Shomette came to the conclusion that the main channel of the Patuxent lay further to the west in the early 19th century, and that the *Scorpion* site lies in what was a small tributary channel that fed into the main channel (Shomette 1998:67). Working under the hypothesis that the remaining flotilla wrecks were located to the west of the site, under what is now wetlands, Shomette, with members of the Natural Resources Conservation Service (NRSC) of the U.S. Department of Agriculture, returned to the area in September to conduct a GPR survey in hopes of finding evidence of wrecks beneath the soil. This effort was focused on the shoreline near the mouth of the Back Channel, which may represent the remnants of the original main channel, approximately 1 km west of the *Scorpion* site. Depth of detection was limited to 1.82–2.44 m (6–8 ft.). A cluster of anomalies was found in the area which might indicate a group of artifacts, but it was not investigated further.

In 1998 and 1999, Larry Babits, Ph.D., brought a team of students from East Carolina University for an underwater archaeology field school program, to investigate the two vessels located in the St. Leonard's Creek transect. Among the 293 artifacts that this project recovered were .69 and .75 caliber musket shot, brass military buttons, a gunflint, a single canister of grapeshot, and copper sheathing nails. The vessels themselves were of a size consistent with vessels from Barney's flotilla and had burn marks indicative of British attempts to destroy them. The Chesapeake Flotilla Project determined that these vessels were indeed Gunboats *No. 137* and *138*. Funding and support came from the State of Maryland, the Department of Defense Legacy Resource Management Program, and the U.S. Naval Historical Center (now NHHC). No work was done in the region of the *Scorpion* site as part of this project.

In February 1999, a further survey was conducted along the shore adjacent to the *Scorpion* site to search for evidence of the sunken flotilla using GPR and electromagnetic induction (EMI). This survey was conducted by the NRSC, MHT, and CSCD. A Subsurface Interface Radar (SIR) System-2 unit was used for the GPR data, along with an EM31 EMI unit from Geonics Limited with a theoretical observation depth of 3–6 m. A GPR signature obtained over the *Scorpion* wreck was used as a benchmark, and readings were taken approximately every 15.24 m (50 ft.) for a total of 284 observation points. The grid was irregularly shaped, but was, at maximum, 304.80 x 411.48 m (1000 x 1350 ft.). While several anomalies were detected within the tested area, none was consistent with a shipwreck of the size of the lost flotilla barges.

4.4 Remote Sensing Survey (2009)

In July 2009, Azulmar Research completed a remote sensing survey along the Hills Bridge Transect of the Patuxent River Maryland, as contracted by NHHC. The area was chosen in order to validate and collect current remote sensing data of the location where marine archaeological anomalies most likely associated with the War of 1812 were previously recorded.

Acoustic data were collected using a Klein 595 digital side-scan sonar system and the data were analyzed using Hypack's hydrographic survey suite. Magnetic data were collected using a Marine Magnetics Explorer magnetometer and the data were analyzed using Hypack's single beam survey editor. Sub-bottom data were collected and analyzed using a Syqwest Stratabox sub-bottom profiler with embedded software. All data were integrated into maps using ESRI's ArcGIS software.

Azulmar Research conducted 6 survey lines along the Hills Bridge Transect (Figure 19). Due to the narrowness of the river, no controlled lane spacing was possible. An attempt was made to space the lines by following the contours along the east and west shorelines. This did not produce even lane spacing, but provided enough separation in the magnetic data to allow for contour plotting (Figure 20).

The remote sensing survey identified three anomalies in the overall survey area. One of the anomalies had both magnetic and acoustic components. The other two anomalies only exhibited magnetic signatures. The first of these was consistent with submerged cultural resources and was indentified in the vicinity of the *Scorpion* site (Figure 21). The other two magnetic anomalies were located just north of Hills Bridge and in the vicinity of a boat ramp at the mobile home park.

Several small linear and point contacts were detected, but they were all consistent with modern debris, fallen trees, and brush. No targets consistent with submerged cultural resources were detected in the sub-bottom profile data.

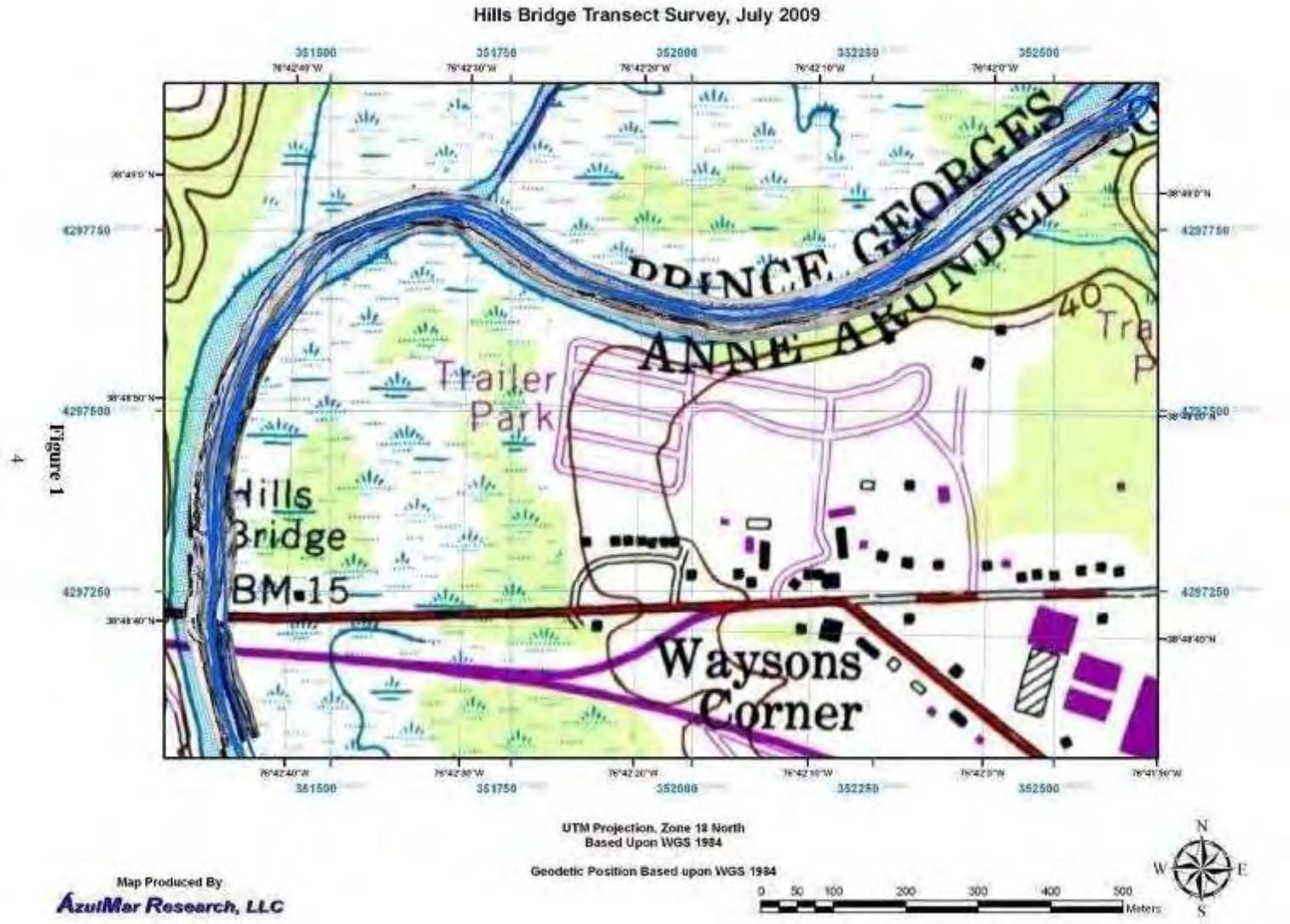

FIGURE 19. Hills Bridge Transect Survey, July 2009, illustrating navigation lines and side-scan sonar coverage (Morris 2009:4).

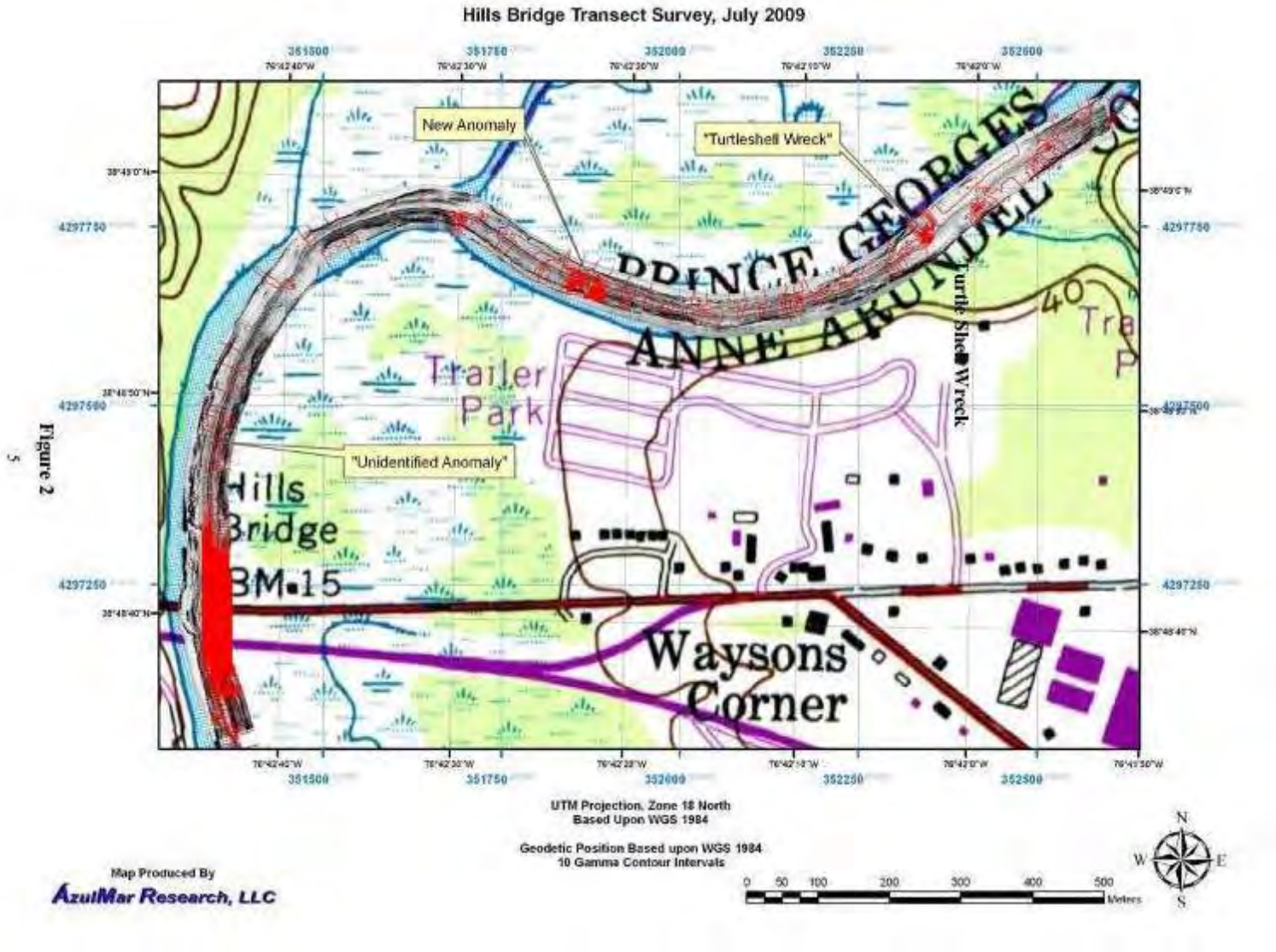

FIGURE 20. Hills Bridge Transect Survey, July 2009, illustrating side-scan sonar coverage and magnetic anomalies (Morris 2009:5).

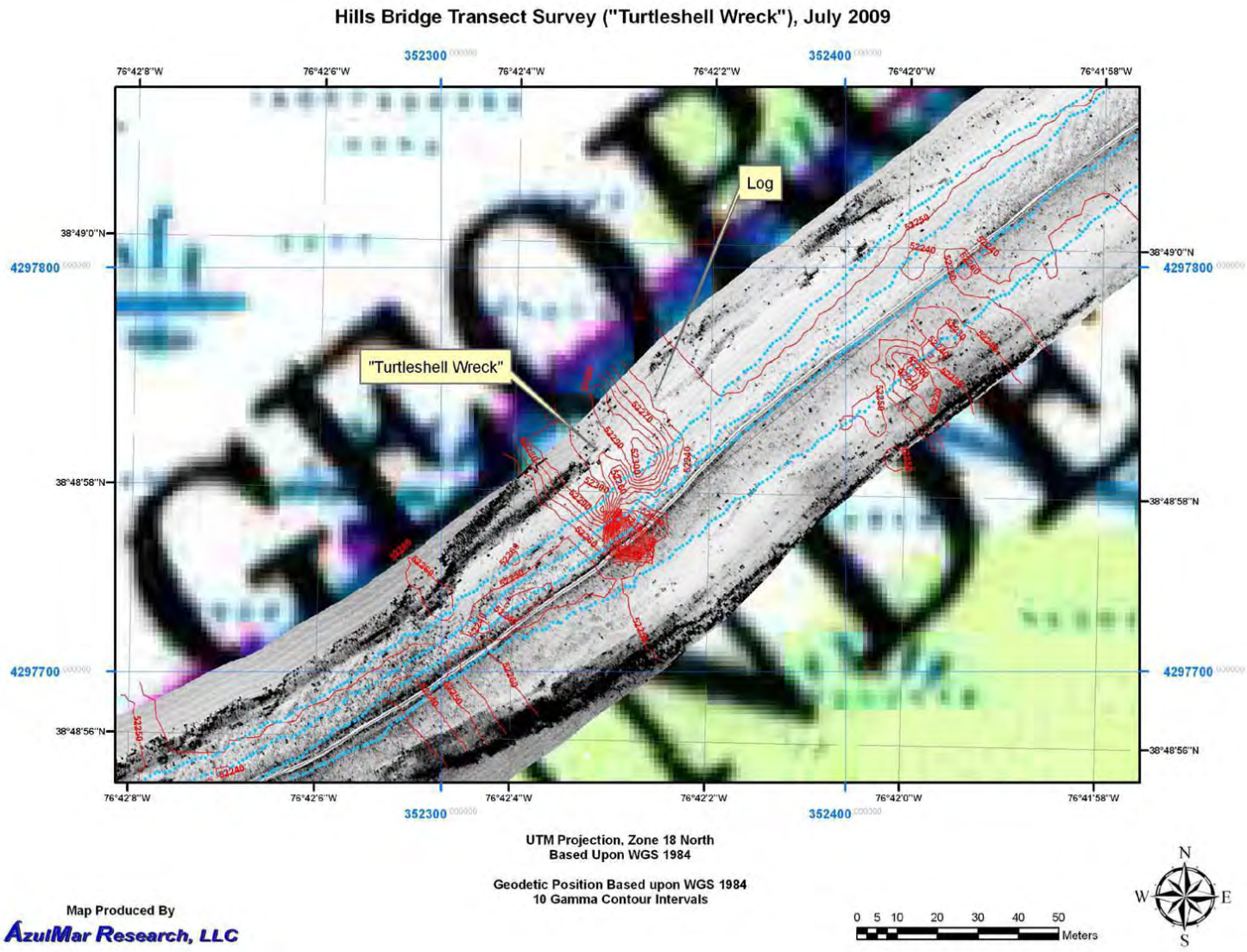

FIGURE 21. Hills Bridge Transect Survey, July 2009, illustrating side-scan sonar coverage and magnetic contour data over the location of the *Scorpion* site (identified as "The Turtle Shell Wreck"). (Morris 2009:8).

The magnetic anomaly that corresponded with the location of the *Scorpion* site consisted of a multi-component magnetic anomaly with a maximum amplitude of 590 Gammas over a duration of 29 seconds (Figure 22). It was detected over all six survey lines. It is co-located with the acoustic anomaly (Figure 23); however, the magnetic contour plot shows that the site is substantially larger than the area identified through the acoustic data. This suggests that the acoustic anomaly identified as the wreck may only be a small portion of it or debris that has accumulated at the location.

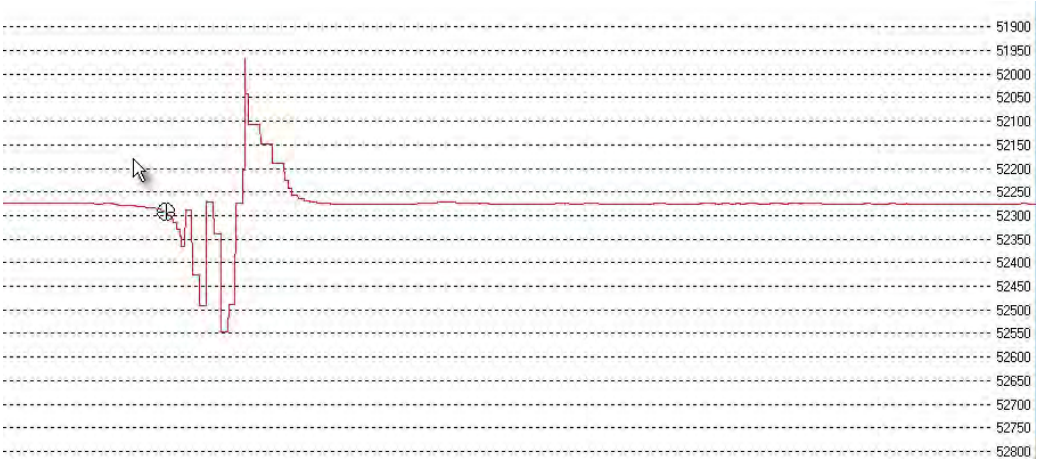

FIGURE 22. Magnetic signature located over the *Scorpion* site (Morris 2009:7).

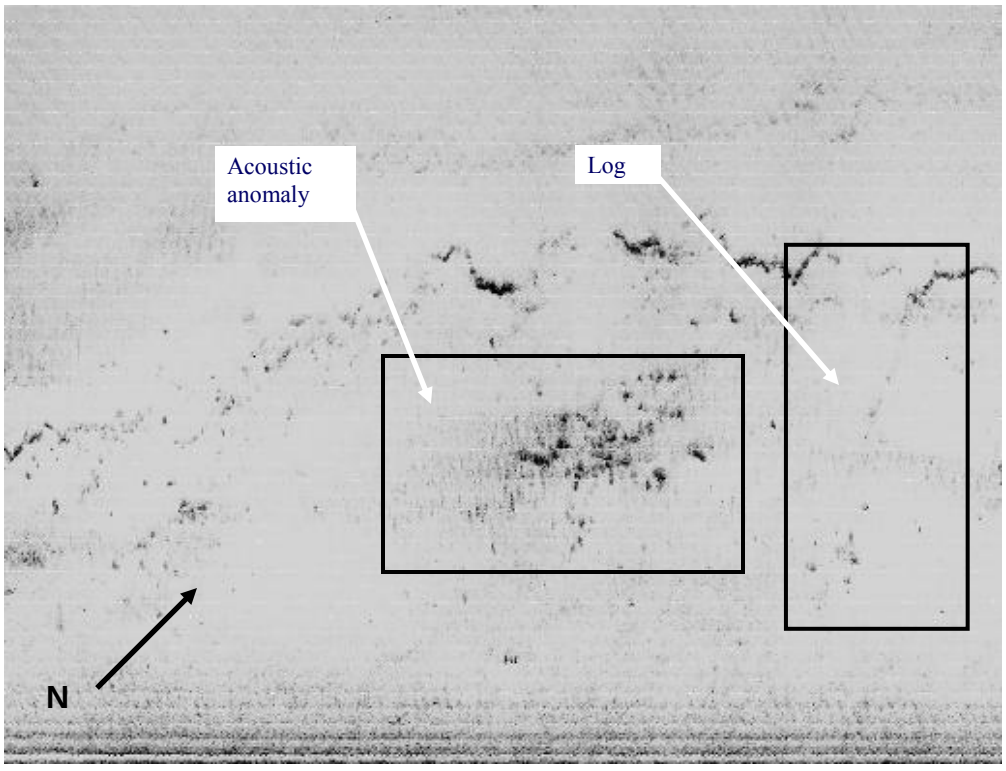

FIGURE 23. Side-scan sonar data of acoustic anomaly suspected to be the *Scorpion* site and adjacent log; anomaly was debris above the site. (Morris 2009: 6).

4.5 War of 1812: "The Turtle Shell Wreck" - Ship Excavation Site Study (2009)

In December 2009, the Calvert Soil Conservation District produced a report for the NHHC (CSCD 2009) that included topographic and bathygraphic data on the Patuxent River at the location of *Scorpion*. The data were collected in October 2009 in order to improve understanding of the wreck site and prepare for a future engineering study pertaining to the placement of a cofferdam.

The report includes a U.S. Geographical Survey map for Anne Arundel and Prince George's Counties, a topographic/bathygraphic survey of the *Scorpion* site, cross-sections of the river at that location, and a proposed cofferdam construction drawing (Figures 24–28).

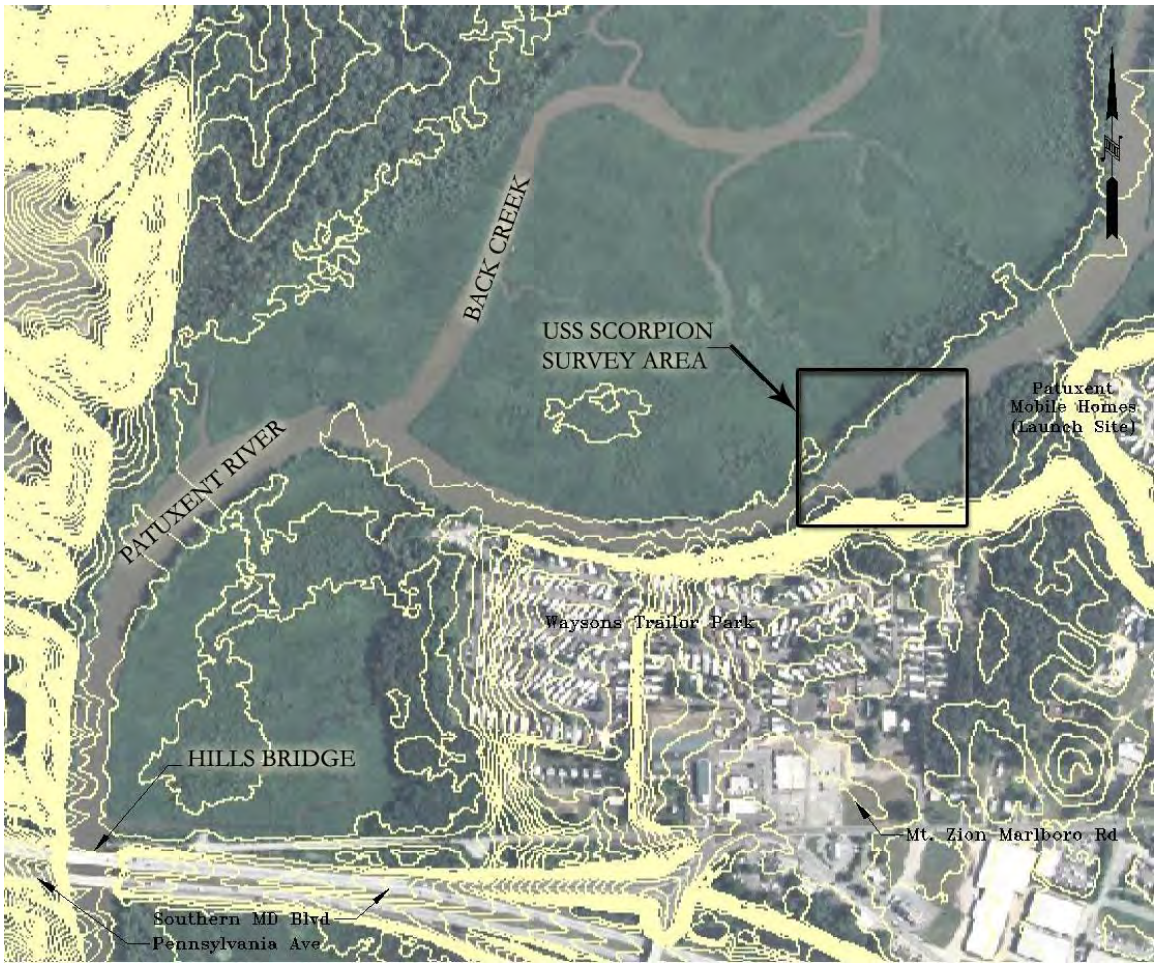

FIGURE 24. *Scorpion* site overview with USGS contour data overlaid on a satellite image of the general area (CSCD 2009).

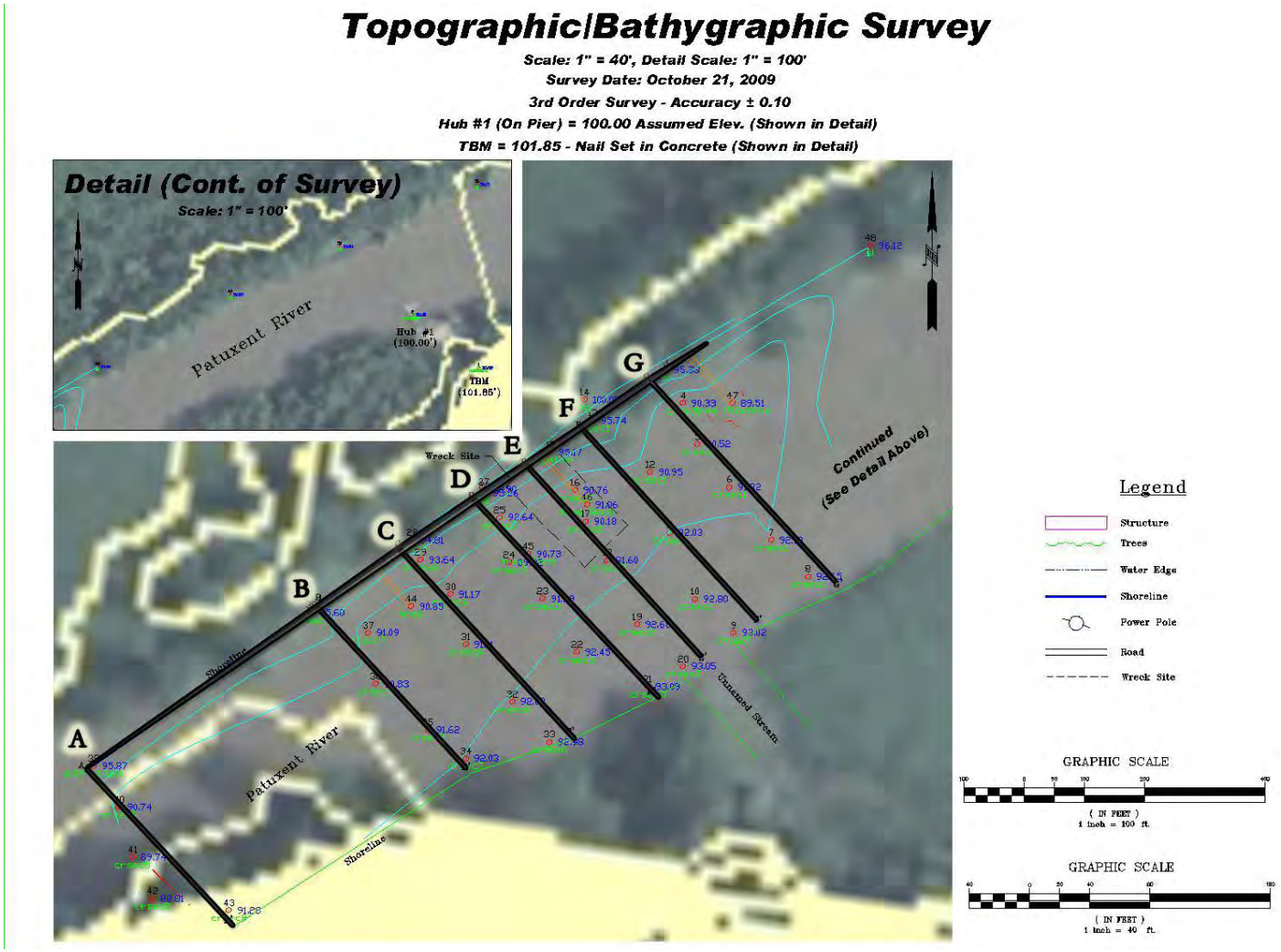

FIGURE 25. Topographic and bathygraphic survey of the *Scorpion* site indicating data collection points (CSCD 2009).

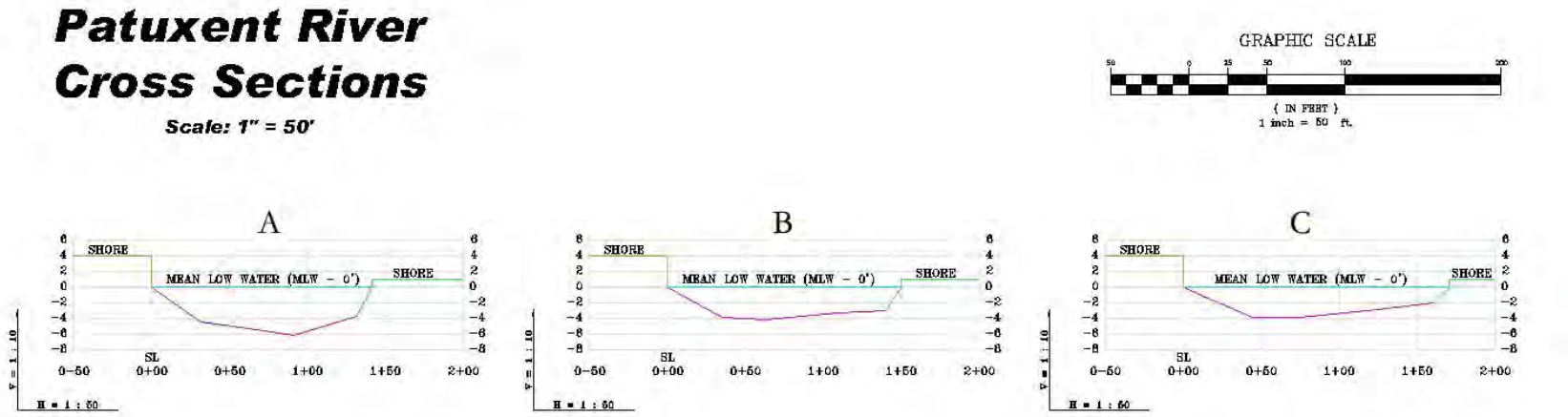

FIGURE 26. Cross sections of the Patuxent River around the *Scorpion* site, reflecting the data collection points A–C visible in Figure 25 (CSCD 2009).

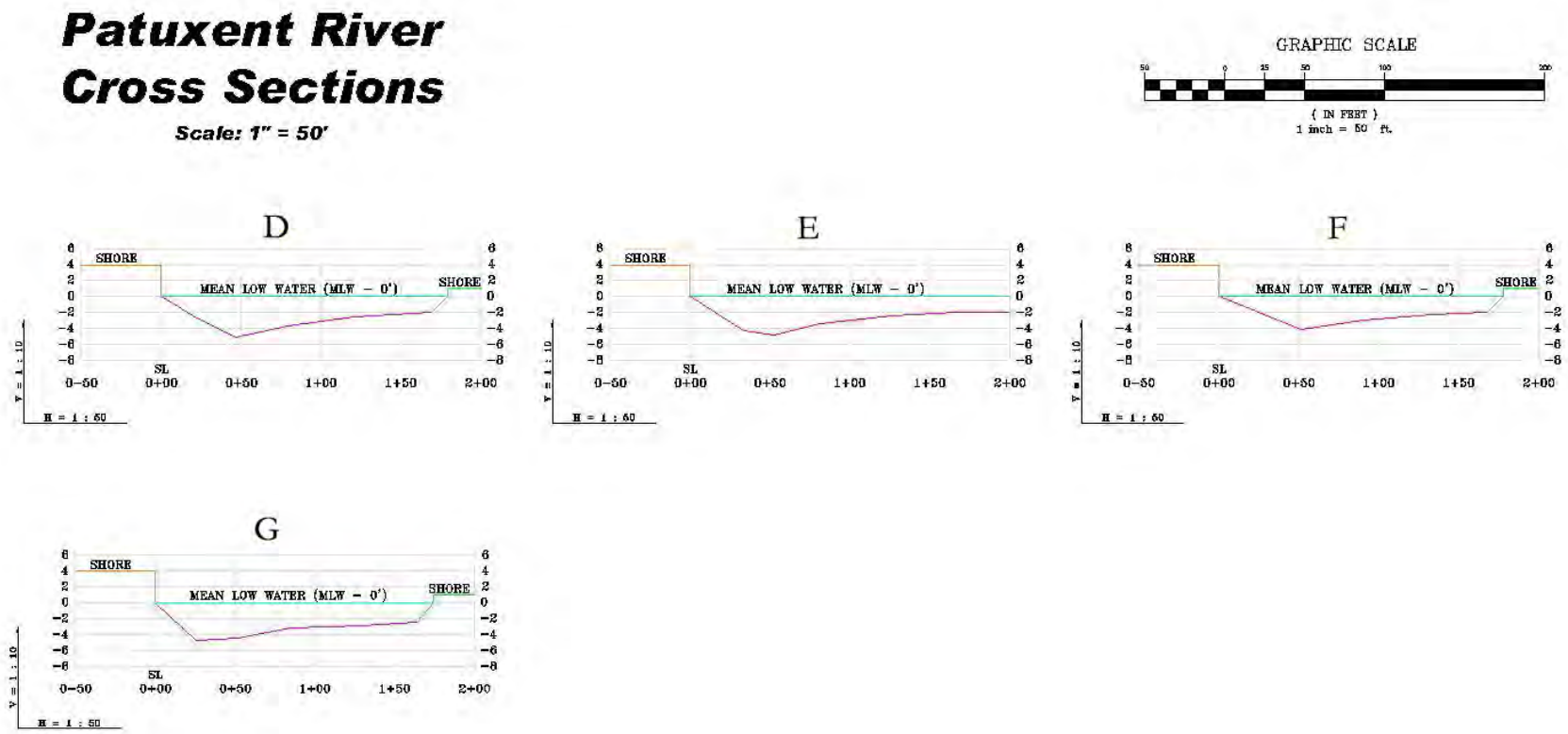

FIGURE 27. Cross sections of the Patuxent River around the *Scorpion* site, reflecting the data collection points D–G visible in Figure 25 (CSCD 2009).

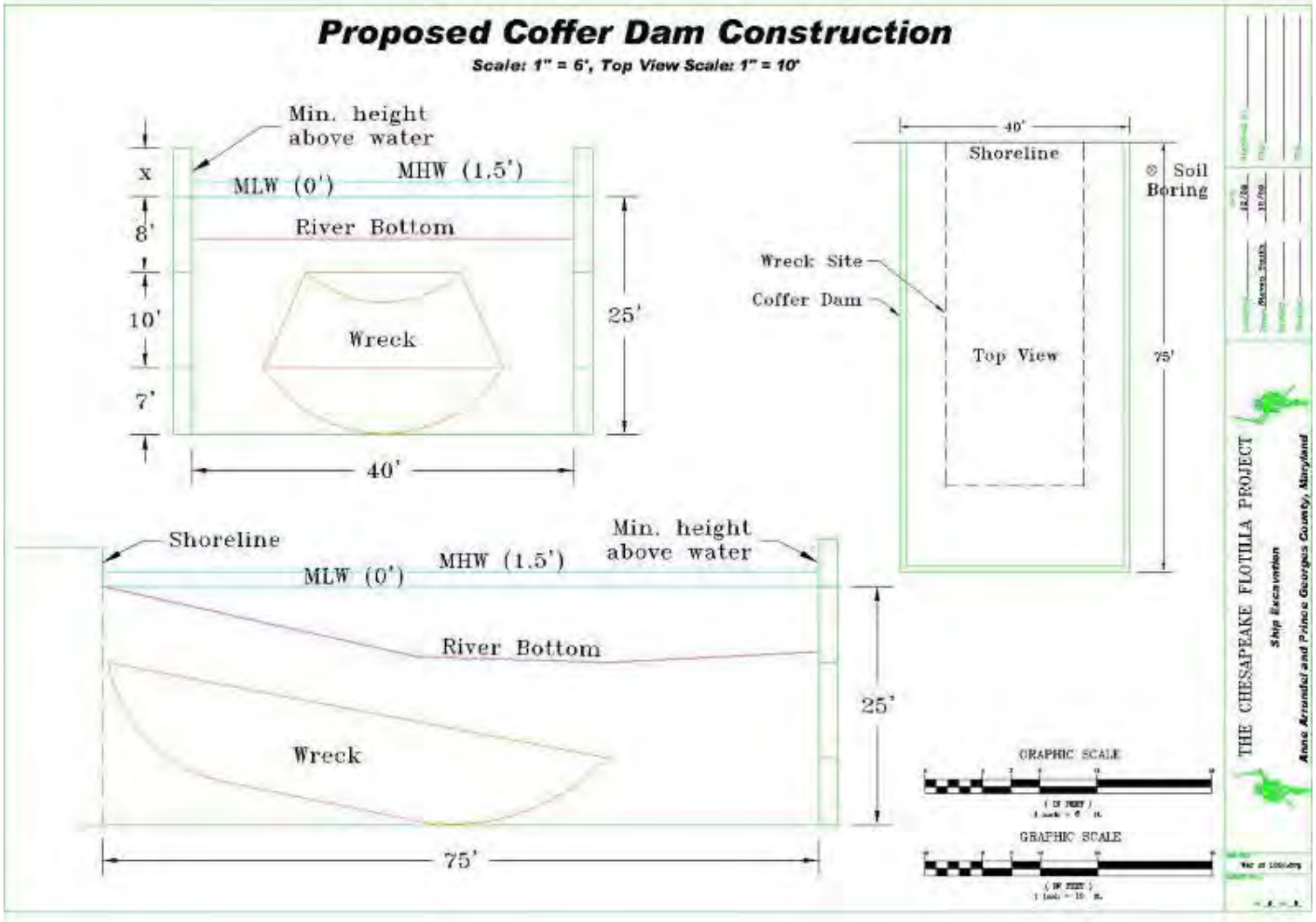

FIGURE 28. Proposed cofferdam construction drawing based on the contour data derived from the topographic and bathygraphic survey (CSCD 2009).

5.0 RESEARCH DESIGN

5.1 Objectives

The 2010 season, which took place between 19 July and 9 August, aimed to identify and delineate the archaeological site presumed to be that of USS *Scorpion*. Attention was also concentrated on establishing the extents of the preserved hull and determining if the site is representative of one or more shipwrecks.

More specifically, researchers attempted to address and answer the following field season objectives:

- Determine the size and orientation of the wreck(s);
- Locate the extremities of the buried vessel(s) and assess their integrity;
- Locate any disarticulated sections of the wreck(s) or artifacts that may lie outside of the main wreck site;
- Open exploratory test units to uncover the hull for the purpose of documentation and sample artifact recovery.

Fieldwork conducted during the 2010 season utilized three primary investigative methods: a remote sensing survey, probing, and limited archaeological excavation.

5.2 Fieldwork Team

Two teams of four to five archaeologists each were present on-site at all times during field operations. One team was composed of individuals from the UAB, while the second team consisted of archaeologists from URS Corporation and MHT. Additional assistance was also offered by volunteers from MD SHA, the Institute of Maritime Archaeology, and the Maritime Archaeological and Historical Society on a part time basis.

The Navy team operated under the direction of Robert Neyland, Ph.D., head of the Underwater Archaeology Branch of the Naval History & Heritage Command. The second team was co-directed by Susan Langley, Ph.D., Maryland's State Underwater Archaeologist, and Julie Schablitsky, Ph.D., Chief Archaeologist for MD SHA. Both field season objectives and daily operational procedures were discussed in advance amongst the entire crew, while diving operations were conducted independently by each party. Operationally speaking, each team was completely autonomous, but there was also fluid on-site collaboration and assistance whenever necessary.

5.3 Logistics

The following is a list of the various equipment, policies, and processes that were required to carry out investigations for the 2010 field season.

Cranes

A large crane was required to lower and recover barges from the Patuxent River at the commencement and conclusion of fieldwork. The crane was leased for mobilization and de-mobilization, for one day each, and operated at Selby's Landing, part of the M-NCPPC's Patuxent River Park facilities.

Tug Boat

A tug boat, *Ellie Lee*, was employed to move the barges between the staging area at Selby's Landing and the archaeological site, a distance of approximately 6.4 km. The tug was primarily used for mobilization and de-mobilization, but was continually on site during the entirety of the 2010 field operations, rafted to the western side of the barges once they were in place.

Barges

A total of five barges, 12 x 3 m, were required to provide adequate platform space for field operations. The barges were placed adjacent to one another on the south side of the wreck site. A layout is presented in Figure 29 (approximately to scale). In total, the barges accommodated a command van (acting as the mission control module), dredge pumps, generators, dive equipment, water storage tanks, a CONEX box used to house dive equipment and conservation supplies, and three large sediment containment units to house excavated material. The barges were moored using anchoring spuds and remained in place for the duration of the field operation.

Secured to the sides of the barges were a total of six small floating rafts or docks, 1.2 x 1.8 m and 1.2 x 1.2 m. Being closer to the surface of the water than the barges, these rafts were utilized as platforms for artifact screening and, if necessary, dredge pumps and/or associated equipment.

Bobcat Compact Excavator

A small Bobcat compact excavator vehicle was housed on one of the barges in order to position and set the barge spuds, help manipulate the sediment containment units, recover artifact baskets or larger artifacts, and engage in any other heavy lifting.

Command Van & CONEX Box

A command van on the barge deck acted as the mission control module. The front section was used to hold meetings, maintain the site plan, coordinate the operation, and act as a computer station, while the aft section acted as the project's field conservation laboratory. This lab acted as an artifact processing center, housed artifact records and the artifact catalogue, and provided a second computer facility for the study of recovered

artifacts. Artifacts were temporarily housed on site and transported back to the Washington Navy Yard at intervals during field operations.

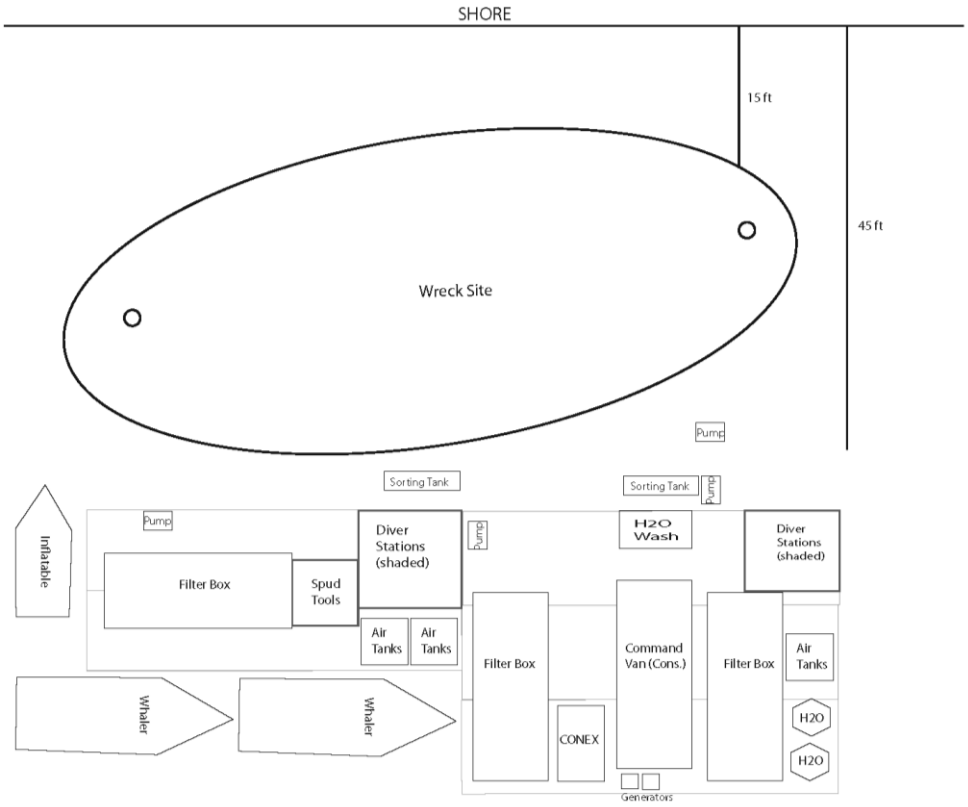

FIGURE 29. Layout of barges on the *Scorpion* site.

Additionally, an NHHC CONEX box was placed within easy access of both conservators and divers, and was used to house dive equipment, spare gear, tool kits, as well as packing supplies, and if necessary artifacts. The CONEX box was locked at the end of the day, providing a secure repository for equipment overnight.

Dredge Equipment

In order to remove overburden and reach the level of the ship, two dredges were employed, one per dive team. The barges nearest to the site held the pumps, dredges, and hoses necessary to undertake the operations and raise sediment as deep as 7.6 m in the river. Two Honda water/trash pumps, models WB20X (2-in.) and WB30X (3-in.), were used as dredges. To transform the water pumps into induction dredge systems, metal venturi heads, or water jets, were fitted onto the end of each pump's discharge hoses, creating suction that could lift overburden and sediment. The hoses were a combination of collapsible fire hose (both canvas and synthetic) and a more durable corrugated polyethylene hose.

To assist with the excavation process and ensure diver safety, structured aluminum shoring was on hand and available for use within the test units. Measuring 2.1 m long by 0.9 m wide by 1.2 m high, the shoring was manually inserted into test units with confirmed ship remains to prevent slumping of unit walls. This saved divers the time and effort of consistently undoing the work of naturally occurring sedimentation deposition, as well as protected for them from moderately strong currents and the risk of unit walls collapsing on top of them.

Excavated material was passed through a ¼ in. mesh screen for artifact recovery purposes and was collected in 250 gal metal stock tanks (2.4 m long x 0.6 m wide x 0.9 m high). Permits issued by the U.S. Army Corps of Engineers and Maryland Department of the Environment stipulated that, due to contamination levels of the affected soil, all sediment and debris passing through the dredge could not be re-deposited into the river and had to be disposed of at an off-site waste management facility. Soil samples were taken in May 2010 and analyzed by Martel Laboratories, Inc. to determine the levels of various compounds in order to locate an appropriate waste facility (Appendix A). Spoil collected in the stock tanks was pumped into one of three large containment units (2.4 m long x 1.5 m wide x 1.8 m high) and de-watered on site using geo-textile mesh cloth prior to its transportation and deposition in an appropriately designated area following field operations.

Dive Equipment

Diving operations were carried out on both ends of the barge configuration, adjacent to the scuba tank storage housing, NHHC CONEX box, and command van. The necessary dive-gear was purchased in advance of the field operations, and tested for safety and utility. This equipment included 3 mm Pinnacle wetsuits, Abyss regulators, fins, Dive Rite buoyancy compensators, and full-face Aga dive masks. A communications system was used to maintain contact with divers at all times. Divers were also line-tended for the duration of operations. Two water containers were purchased and filled with an estimated 900 gal (3,420 liters) of water in order to provide for the daily cleaning of dive gear and temporary storage of artifacts.

Marine Transportation

An inflatable vessel, a Carolina skiff, and two Boston Whalers were used for transporting people and supplies from shore to the barges. The inflatable and the Whalers were supplied by NHHC, and the skiff by the Maryland Historical Trust. All boats were kept overnight at Patuxent River Park, courtesy of M-NCPPC, and occasionally at the Patuxent Mobile Estates' pier when inclement weather forced the project to shut down (Figure 30).

Site Security

Given the amount of gear and recovered artifacts that were present on the stationary barges overnight, site security was required for the duration of the field operation. Site

security was purchased by Maryland State Highway Administration and carried out by D Best Security & Protection Services, providing two security enforcement officers to be on site daily throughout the evening/early morning hours (7:00 p.m. through 7:00 a.m.).

FIGURE 30. Private river access point and dock north of the *Scorpion* site (Image © 2010 Microsoft Corporation. Pictometry Bird's Eye © 2010).

Artifacts

All artifacts recovered during the 2010 season were given a temporary field number, documented, and photographed prior to being carefully packed and prepared for the trip to shore and the Washington Navy Yard. At the Navy Yard, conservators inventoried the artifacts and initiated their conservation treatment. While conservation is ongoing, the artifacts were researched in order to facilitate production of the final site report. Upon the conclusion of their treatment, the artifacts will be curated at the UAB laboratory, pending eventual exhibition.

5.4 Site Preparation

Prior to mobilization or excavation, the first task of the field season was to cut and remove any overhanging foliage and debris from the area of the archaeological site. This was handled by employees from URS, MD SHA, MHT and NHHC. Per instructions from M-NCPPC, no live foliage could be cut down, but the team could tie and secure intrusive pieces out of the way. Additionally, a large tree trunk and several branches that had fallen into the river and rested over the wreck were also removed.

5.5 Remote Sensing Operations

In order to ascertain the size and orientation of the wreck site for planning of future fieldwork and to be used in engineering studies for the possible installation of a cofferdam, extensive site surveys were conducted on the suspected *Scorpion* wreck site. The surveying objectives for 2010 were to determine the extents of the wreck site and to verify that only one vessel is present at the archaeological site. Systematic surveying was also conducted along a stretch of the Patuxent River in the vicinity of the *Scorpion* wreck site as the rest of the Chesapeake Flotilla was purported to have been scuttled nearby. This was largely undertaken by URS with assistance from members of MHT, MD SHA and NHHC.

A summary of methods employed in the remote sensing and hydro-probe surveys was provided in the final report from URS (Pelletier et al. 2011), submitted to SHA as a contractual requirement for the 2010 field investigations, and is reproduced here in its entirety:

> URS conducted the remote sensing survey for the 2010 USS *Scorpion* project from a 6.7-m (22 ft) Carolina Skiff provided by the MHT's Underwater Archaeology section. The survey was conducted along parallel track lines spaced at 3-m (9.84-ft) intervals. The survey lines defined a block of 19 transects measuring 200 m (656-ft) in length. The actual project area measures approximately 45 m (l48-ft) by 30 m (98-ft) and totaled 200 linear meters (656 linear ft.) of data collection.
>
> The remote sensing survey was designed to identify magnetic or acoustic anomalies and/or clusters of anomalies that might represent submerged cultural resources associated with the USS *Scorpion* and to help delineate the extent of the 18PR226 wreck. The natural and anthropogenic forces that form sites typically distribute materials (e.g., ship's fasteners, anchor chain, vessel ballast, weaponry, cargo, tools, and machine parts) in linear scatters based upon current speed and bottom topography. When a survey is correctly designed and conducted using high resolution side scan sonar and magnetometers, these ferrous components from a vessel can be differentiated from the earth's ambient magnetic field.
>
> Several criteria are used to evaluate remote sensing data, in order to properly distinguish between naturally occurring magnetic and acoustic anomalies and those of cultural significance. The first criterion is the duration (both time and distance) of the magnetic perturbation. The second criterion is the amplitude or size of the magnetic field deflections, which are measured in nanoTeslas (nT). The third criterion is the complexity of the magnetic perturbation.
>
> Magnetic deflections are referred to as either dipoles (D) or monopoles (± M). Positive and negative magnetic anomalies (monopoles) refer to one half of a

dipolar perturbation and usually indicate an isolated source of deflection that is some distance from the sensor. The monopoles produce either a positive or negative deflection from the ambient magnetic field, depending on how the ferrous object is oriented relative to the magnetometer sensor and whether its positive or negative pole is positioned closest to the sensor (Figure 31). Dipolar signatures display both a rise and a fall above and below the ambient field. Dipoles also are commonly associated with single source anomalies. In the case of dipoles, however, the magnetic sensor has passed directly (or close to object) over the source of the perturbation. Magnetic perturbations that are multicomponent represent several ferrous objects with different magnetic orientations and are likely associated with man-made objects.

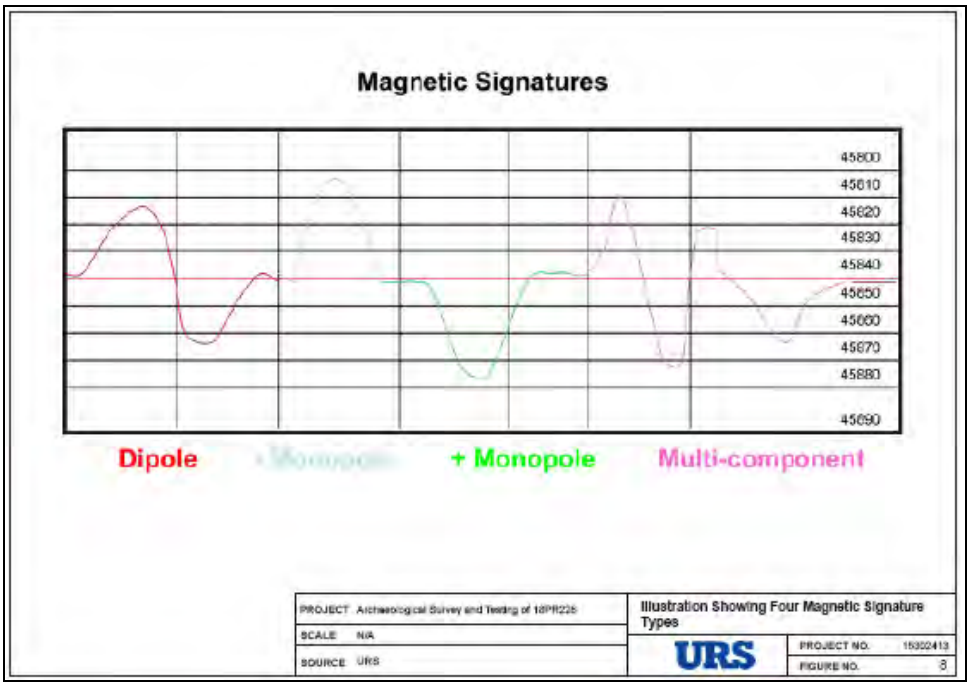

FIGURE 31. Illustration showing four magnetic signature types (Pelletier et al. 2011:14).

The final two criteria for evaluating remote sensing anomalies apply to magnetic data analysis. These are the location of the center of each perturbation in relation to the acoustic data and the patterning or distribution of the centers of magnetic distortions. Side scan sonar data are used to visualize the bottom and identify any culturally significant material and to map the geomorphology and bathymetric anomalies within the survey area.

The survey array used for the current project consisted of the following: a Differential Global Positioning System (DGPS), a cesium vapor marine magnetometer, and a 430-490 kHz scanning chirp side scan sonar. Hydrographic

and navigational controls were achieved by the use of Hypack Max survey software.

Positioning

A Hemisphere Crescent R130 DGPS with inertial navigation corrections (for up to 45 minutes after loss of signal) was used for this survey. The Hemisphere system transmits information in NMEA 0183 code to a computer navigation system, using *Hypack* software. The *Hypack 10* software incorporates the NMEA 0183 data string transmitted by each component of the sensor array and displays vessel position on a computer screen relative to pre-plotted track lines as well as each sensor. It also performs instantaneous data translations between various geodetic projections as well as tagging all incoming data with positioning for seamless data integration and post processing. *Hypack's* navigation files can be utilized to produce track line maps and to derive X, Y, and Z data sets for analysis and contour plotting. Positioning control points were obtained at every 30.48 m (l00 ft) along transects. The Hemisphere Crescent 130 DGPS is considered to be accurate to within 20.32 centimeters (8 in).

Magnetometer

A Geometrics G881 marine magnetometer was used for the magnetic survey. The G881 is a 0.01 nT sensitivity cesium magnetometer that is linked to *Hypack,* enabling precise real-time positions for recorded magnetic data. Survey was terminated if induced magnetic background noise exceeded +/-3 nTs. The magnetometer sensor was towed a minimum of 2.5 times the length of the vessel from the transom to avoid magnetic interference from the hull and electrical system and was floated at the surface to avoid any snags on the river bottom.

Side Scan Sonar

A Triton Starfish 450 kHz scanning FM chirp side scan sonar system was used to collect acoustic data for this survey. The 450 kHz system produces high resolution images with moderate ranges of a few hundred feet. The scanning chirp acoustic side scan sonar is a relatively new technology that allows multi-frequency (430-490 kHz) acoustic energy to build sonar images of the bottom with very good reflectivity and roughness sensitivities that helps to differentiate anthropogenic acoustic targets from natural sources. Navigation fixes are imbedded with the acoustic data in real time, allowing the images to be geo-referenced and side scan mosaics created for analysis. [Additional sidescan sonar equipment provided by MHT was also utilized.]

Data Collection and Position Control

Hypack survey software was used for survey planning and data collection. Once the survey was designed and track lines were planned, the *Hypack* survey module is used to establish survey control as well as to design data collection and correction. While surveying, the planned transects were projected onto the navigation screen. Similarly, the data being collected were projected onto the monitors, allowing real time quality control, as well as flagging of anomalous data.

All remote sensing data were correlated with DGPS positioning data and time through *Hypack.* Positions for all data were then corrected through the software for instrument layback and offsets. Positioning was recorded using Maryland State Plane grid coordinates, referencing the North American Datum of l983 (NAD-83); meters were the units of measure.

The methodology employed during the survey produced favorable results, with reliable DGPS signals, low noise levels on the magnetometer, and clear acoustic images given the speed of the Patuxent River in this reach. All positioning and remote sensing equipment performed reliably throughout the survey. Regular and evenly spaced coverage of the survey area was achieved, allowing the identification of cultural material within the greater survey area.

Remote Sensing Data Analysis

Magnetic and acoustic data were reviewed in the field as they were collected for any anomalies. The data were reviewed again during post-processing using *Hypack* data review module and Golden Software's *Surfer* (Version 8). These computer programs were used to assess the duration, amplitude, and complexity of individual magnetic disturbances, and to plot their positions within the project area to better understand their spatial patterning and association with other anomalies (acoustic as well as bathymetric).

The project remote sensing team maintained field notes on the locations of modern sources of ferrous material, such as drums or bank line debris that would have affected the magnetic field readings. Any magnetic perturbation of 3 nT or more with durations greater than 20 seconds were cataloged for further analysis. Acoustic imaging was reviewed for anomalous returns that could be associated with significant submerged cultural resources. Both acoustic images and magnetic contouring were checked against bathymetric data for any correlation. Pelletier et al. 2011:7-15)

5.6 Hydro-probe Survey

Hydro-probe data were also collected by URS, primarily operating from the Carolina Skiff belonging to MHT. The methods used have been excerpted from that report as follows:

> The survey was conducted along a 45-m (148-ft) by 30-m (98-ft) rectangular grid (1350 square m or 14,500 square ft) using a 3-m (9.8-ft) grid interval. The grid was centered on the proposed shipwreck site as reflected in the magnetic data. The 3-m (9.8-ft) spacing for the 45-m (148-ft) block yielded 176 probe locations (Figure 32).

FIGURE 32. Detail of project area showing hydro-probe points and results (Pelletier et al. 2011:17).

> The probing survey was designed to identify potential material culture and construction elements associated with 18PR226 and to aid in the design and placement of a potential coffer dam around the site for future excavations. The hydro-probe survey equipment consisted of the following: a DGPS, a 6.5 Hp Honda high pressure water pump, and a 5.8-m (19-ft) copper probe (Figure 33).
>
> Navigational and survey controls were achieved by the use of *Hypack* survey software and a Hemisphere DGPS. The Hemisphere Crescent Rl30 DGPS with

inertial navigation corrections (for up to 45 minutes after loss of signal) was used for this survey. The Hemisphere system transmits information in NMEA 0183 code to a computer navigation system, using *Hypack*. The *Hypack* software displays vessel position on a computer screen relative to pre-plotted probing locations. The Hemisphere Crescent 130 DGPS is considered to be accurate to within 20.32 cm (8 in), in optimal conditions of clear sky and unobstructed horizon.

FIGURE 33. Hydro-probe operations (Pelletier et al. 2011:Fig.19).

A 6.5 Hp Honda high pressure low volume water pump was used to supply a constant pressure water supply for the probing survey. The water manifold on the pump had a series of ball valves that could be opened to regulate the water volume and pressure being supplied to the hydroprobe tip (Figure 34). A sectional 5.8-m (19-ft) copper hydro-probe was used to complete this phase of the survey. The probe consisted of four 1.52-m (5-ft) long copper pipe sections with an interior diameter of 1.57 cm (0.6 in.). Each pipe section had a threaded union at each end that connected together as needed to ensure a probe depth of at least 3 m beneath the sediment surface. The hydro-probe used a water stream projected from the leading edge of the probe to liquefy sediments ahead of the probe, which allowed greater depths to be reached. The constant liquefaction of the sediments along the margin of the hydro-probe pipes kept it from becoming trapped in the sediments. Using the hydro-probe, trained archaeologists can differentiate between various materials, such as metal, wood, glass, and ceramics by the sound and feel of the probe. (Pelletier et al. 2011:15-20)

FIGURE 34. Hydro-probe pump (Pelletier et al. 2011:Fig 21).

5.7 Diving Operations

2010 diving operations were split between the two dive teams, with one team operating under the U.S. Navy dive program and the other operating under the URS dive program. Both operations, though autonomous, followed OSHA Commercial Diving Operations regulations (29 CFR Part 1910, Subpart T). The operations were undertaken with SCUBA and wireless voice communications (using AGA Masks and comms). According to OSHA Instruction, each SCUBA diver was to be line-tended when the current exceeded one knot, which was always the case at this site. All diving was conducted from the barge. Divers entered the water via a ladder suspended from the dive platform slightly upstream of the site and swam to the work area with the visual aid of a baseline on the riverbed leading to the trench.

5.8 Excavation

Following the collection and interpretation of the side scan, magnetometer, and hydro-probe data, the two archaeological dive teams were deployed to open test trenches on the wreck site. The objectives of the test units were to determine the vessel's orientation, assess its state of preservation, locate potential areas of damage, identify any associated artifact debris fields, examine the areas previously investigated, and, finally, assess the vessel type and its possible identity.

Test Units

Two trenches were initially opened in priority areas. These are defined as specific locations on the wreck that are useful for diagnostic and orientation purposes, more specifically the bow, stern, and midships areas. Based on the clusters of magnetic anomalies and hydro-probe hits, the first two units (Test Units #1, to the south, and #3, to

the north) were set at each end of the suspected vessel. A third trench (Test Unit #2), in the center, was added once it was clear there was sufficient time in the two-week field season to accomplish it.

The first stage of excavation involved establishing a baseline over top the buried wreck. The team used GPS coordinates based on the aforementioned data to establish the ends of the baseline at the longitudinal extremities of the vessel. The anchoring points of the baseline were made from 1.5-in. (3.8-cm) PVC pipe and approximately 1.5 m long. After being firmly staked into the ground, they were additionally weighted to the bottom using concrete cinder blocks. After the end points were erected, a graduated baseline was laid between them. The downriver end of the baseline was deemed the zero end of the line and ran at a 50°-230° magnetic axis exactly 23 m to its partnering anchoring point upriver. The southern, or zero, end of the line was designated Point A while the northern end became Point B.

Once the baseline was established, it was necessary to delineate the test excavation units. Defining the test units was accomplished by fashioning several stakes (made of both PVC pipe and wood) of equal length and securing them into the riverbed at each specified corner. The first two corner stakes were secured on the baseline itself at predetermined coordinates, while the two remaining stakes were placed west of the two baseline points, toward the shore. As this was done, a polypropylene line was strung between each of the staked corners to define the edges of each unit.

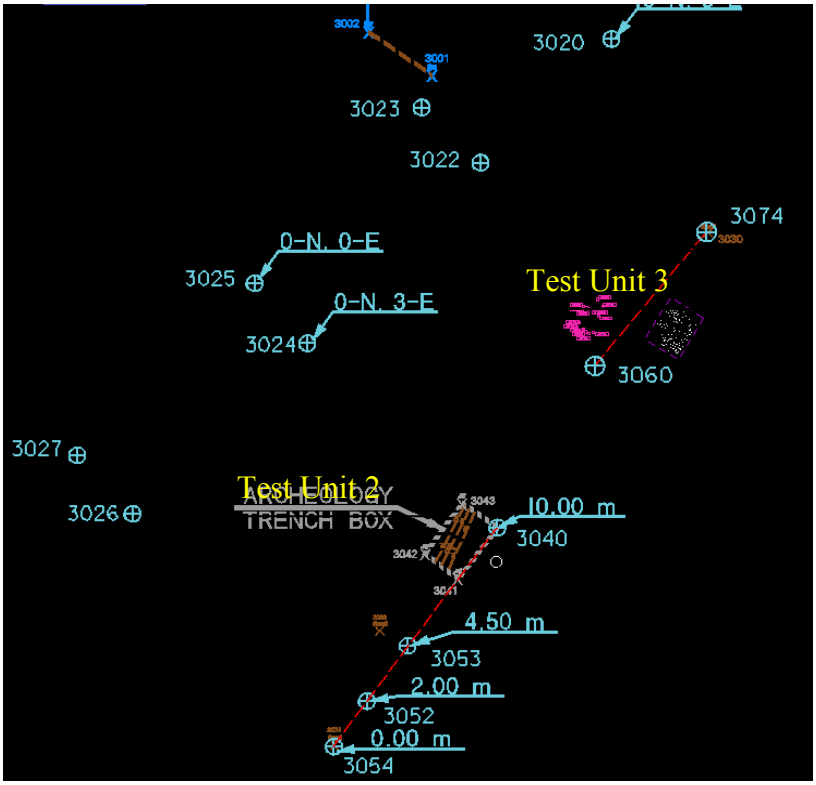

FIGURE 35. Georeferenced locations of Test Units #2 and #3.

The next stage of excavation included a geographical landscape survey, conducted by Maryland State Highway Administration, in order to tie site and artifact location information into the surrounding physical landscape. Using a Total Station and stadia rod, location information was gathered from the test trench boundaries and georeferenced into the site plan (Figure 35).

After test units were defined and as the total station survey took place, the excavation portion of the project commenced. Induction dredges were used to remove alluvial overburden and sediment along the upper portions of the hull. Pumps were run at moderate to high power, granting divers the ability to excavate efficiently while carefully maintaining control over the dredging. Excavations were carried out in a stratigraphic fashion, with each new soil layer being observed and recorded by archaeologists.

Total sediment removal throughout the duration of the excavation was estimated to be less than 50 m^3. All excavated dredge spoil was brought to the surface, passed through a 0.25 in. mesh screen, and collected in large metal stock tanks situated on the small rafts. During and after the artifact screening process, sediment collected in the stock tanks was pumped into one of three large containment units where it was held for the duration of project. At the end of the field season, all captured sediment was transported to an upland approved waste management facility for proper disposal.

Supplementary Hydro-Probe Tests

During the excavation phase, additional hydro-probing took place in order to more definitively outline the wreck. For this second phase of probing, a line was established from Point A on the baseline and ran at a heading of 1.64° toward the edge of the western shore (Figure 36). The length of this line was 21 m and its terminus was designated Point C. Utilizing the same probing equipment as before, tests were taken along this line in 1- to 2-m intervals. Another line was established between Point C and the 10 m mark on the baseline running at a 153°-333° magnetic axis. This new intersection became Point D and probe tests were taken at the same 1- to 2-m interval. Finally, additional probing was done along the baseline from Point D back downriver to Point A. In total, 37 tests were taken during this hydro-probing set.

Artifacts and Documentation

Artifacts were only recovered for diagnostic purposes or to prevent their loss in the event that the excavators believed *in situ* preservation has been compromised. Upon recovery artifacts were catalogued, recorded and provided with the necessary first-aid stabilization treatments. Artifacts were evaluated daily and whenever possible returned to the NHHC Archaeology and Conservation Laboratory on the Washington Navy Yard for further treatment and study. Artifacts are being conserved at the NHHC laboratory, unless the laboratory manager deems it in the best interest of an artifact to be treated elsewhere.

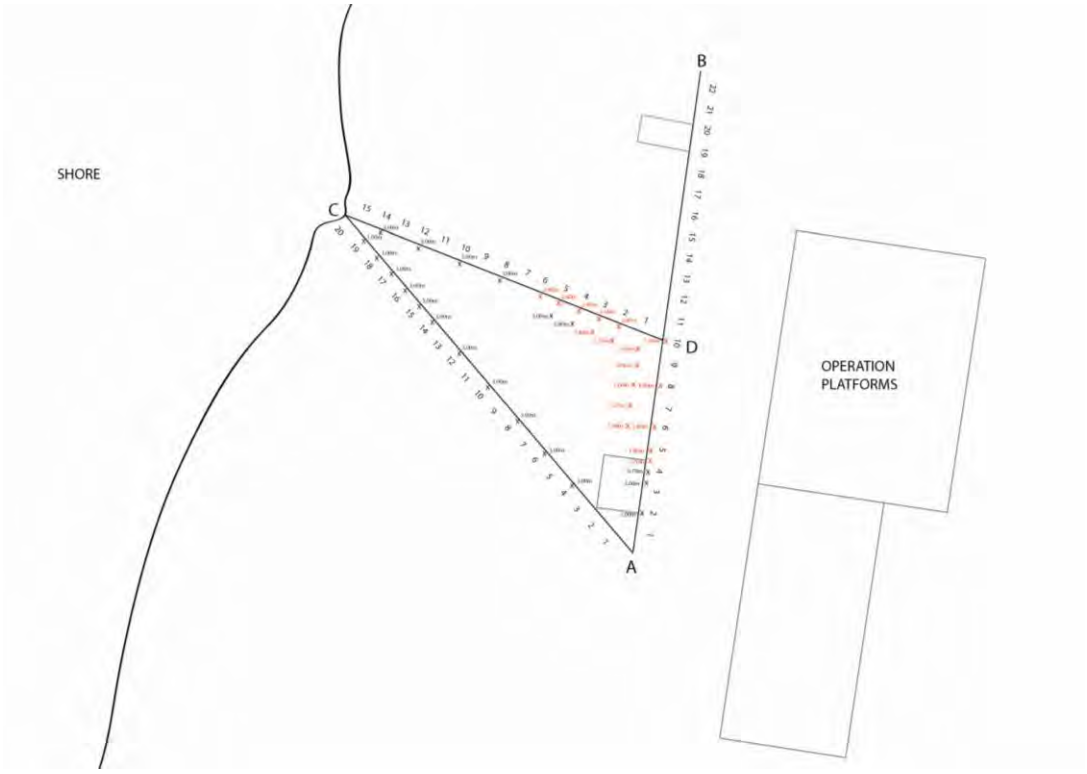

FIGURE 36. Location of baseline, initial test units, and supplementary hydro-probe hits.

After the excavation process, all hull timbers and associated artifacts were carefully recorded and documented. This was done primarily by hand, with divers making scaled drawings and taking detailed measurements using metric tapes/rules. When recording, all timbers dimensions were recorded in three dimensions whenever possible, and compasses headings were also taken to establish hull orientation. Findings were initially recorded on gridded Mylar sheets and copied more legibly after the dive. The wreck was additionally documented with the use of a Canon Optura underwater video camera. As with all aspects of the project, great care was taken not to damage or compromise the shipwreck or accompanying artifacts during this phase.

Site Restoration

Upon completion of the excavation, sand bags were placed beneath the planking in Trench #2 to help support the timbers upon reburial. The aluminum shoring was then removed and the exposed test trenches were backfilled with sterile sand. It is expected, however, that the river's current will naturally fill any exposed gaps and/or depressions.

6.0 RESULTS AND ANALYSIS

6.1 Analysis of Remote-Sensing and Hydro-Probe Data

Results of the magnetometer and hydro-probe surveys were reported by URS (Pelletier et al. 2011) and are excerpted as follows:

Magnetometer Survey

> The project area encompassed site 18PR226, the suspected location of Commodore Joshua Barney's flagship, the USS *Scorpion;* the project area was also extended to include the possible location of other ships of Barney's Chesapeake Bay Flotilla. The remote-sensing survey block was located north of the Route 4 Bridge in the Patuxent River, historically known as Hill's Bridge. The survey was conducted along 17 of the 19 parallel track lined; transects were spaced at 3-m (l0-ft) intervals, and each were 200 m (656 ft) in length [Figure 37]. A total of 3,400 linear m (12,467 linear ft.) were evaluated during the survey, which covered approximately 0.96 hectare (2.37 acre). Two transects were not surveyed due to shoal water.

FIGURE 37. Project area showing planned survey lanes (Pelletier et al. 2011:11).

No acoustic anomalies were recorded during the survey. This result was consistent with pre-survey expectations, due to the known sedimentation in this section of the river. In total, 57 magnetic anomalies were recorded in the study area. Seven of these magnetic anomalies fall within the 30- by 45- m (98- by 148-ft) hydro-probe survey block [Figures 38 and 39]. Water depths ranged between 2 to 3 m (6 to 9 ft) for the majority of the survey area. A variety of sport and pleasure vessels regularly transited the margins of the study block. No commercial craft were recorded in the area during the project.

The magnetic anomalies appeared to be clustered along the river's western bank line, encompassing the boundaries of site 18PR226 and adjacent areas. This distribution pattern would be expected given the water depths and river currents in this section of the river.

As noted above, a total of 57 magnetic anomalies were recorded during the current survey; each was assigned a number prefixed with M, for magnetic anomaly. Each magnetic anomaly was evaluated using several criteria: anomaly duration (either time or distance); magnetic field deflection or amplitude, measured in nanoTeslas (nT); magnetic signature (monopole, dipole or multi-component); spatial association; and patterning. If a magnetic anomaly has characteristics that may represent a submerged cultural resource (e.g., multi-component, long duration, complex patterning, or high amplitudes), or if several anomalies appear to be spatially associated, they are grouped into a remote sensing target. A target may also include acoustic or bathymetric anomalies. The remote sensing targets were characterized solely based on magnetic anomalies.

Seven magnetic anomalies were identified as being within the site 18PR226 hydro-probe survey block. The interpretation of these seven anomalies range from isolated debris to large, deeply buried ferrous masses. All of these anomalies have the potential to represent significant cultural resources and were defined as Targets 2 [(Anomalies M29 and M36), 3 (M22 and M25), and 4 (M4, M11, and M20)]. The project team identified an additional 50 magnetic anomalies and 10 remote sensing targets outside of the hydro-probe survey block du-ring the course of the project. (Pelletier et al. 2010: 27)

The remote sensing survey extended beyond the boundaries of the probing area to insure complete coverage of the study block and to help delineate shipwreck debris. Analysis of magnetic data recorded beyond the boundaries of the survey area resulted in the identification of ten additional magnetic target clusters that have characteristics associated with submerged cultural resources. These targets could represent other vessels or elements associated with Barney's Flotilla. (Pelletier et al. 2010: 36)

FIGURE 38. Project area showing magnetic anomalies overlaid on side-scan data (Pelletier et al. 2011: 31).

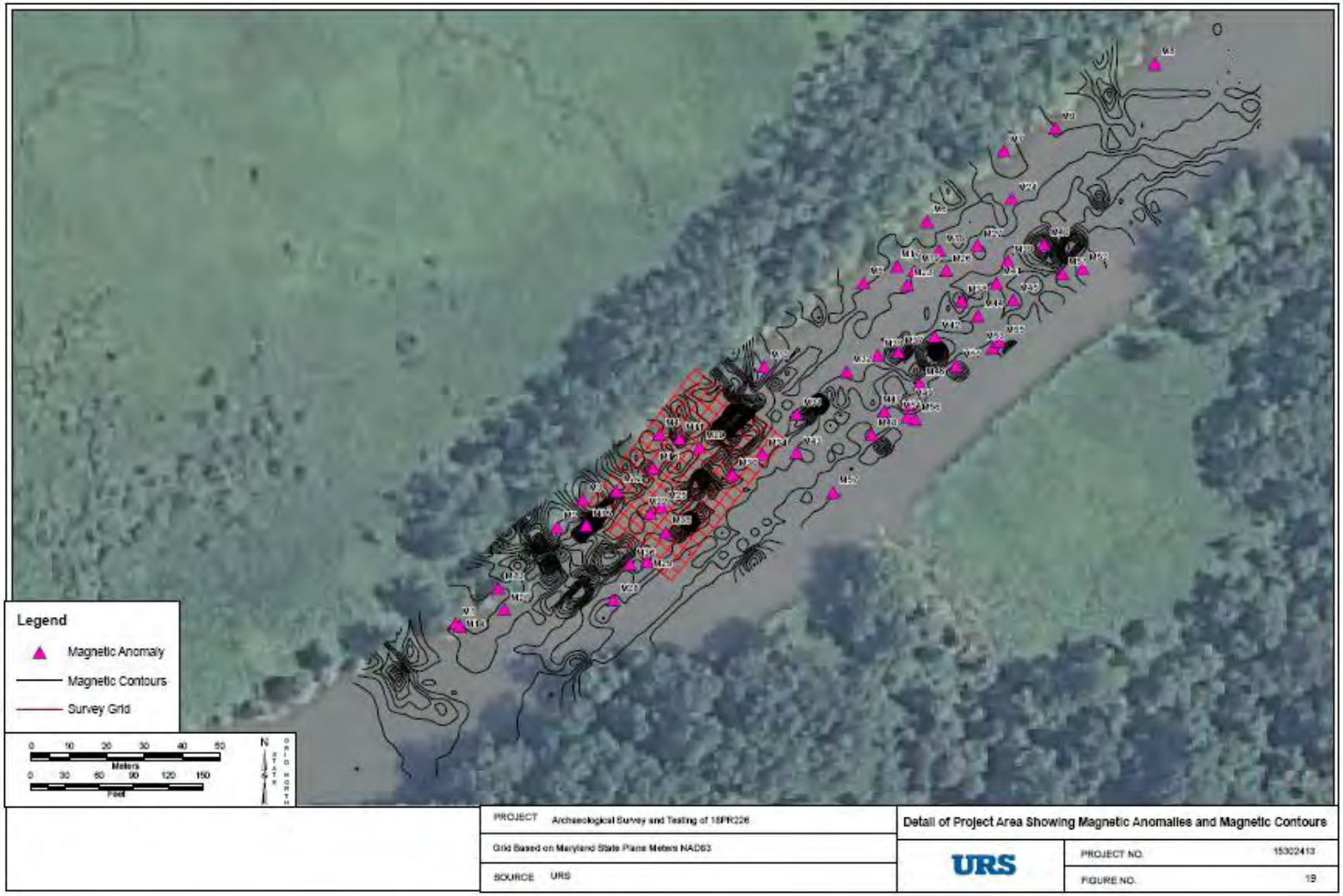

FIGURE 39. Detail of project area showing magnetic anomalies and magnetic contours (Pelletier et al. 2011:33).

> [The] three targets … identified inside of the hydro-probe survey block… clearly exhibit magnetic characteristics (such as multi-component signatures, complex magnetic coupling or linkage) typical of a shipwreck. The remaining 10 targets (encompassing 50 anomalies) are located outside of the hydro-probe block around site 18PR226. Six of these targets (Targets 1, 7, 8, 11, 12, and 13) have a moderate to high probability of representing submerged cultural resources and warrant further archaeological investigation. It is suspected that some or all of these targets may be related to other vessels from Barney's Chesapeake Bay Flotilla that were scuttled at the same time as the *USS Scorpion*. The nine listed magnetic targets inside and outside the hydro-probe survey block should be examined through additional probing and excavation to determine if they are part of a vessel or its armament. (Pelletier et al. 2010: 75)

Hydro-Probe Survey

> The hydro-probe survey was conducted using a 3-m (10-ft) grid with the option to decrease the grid to 1.5-m (5-ft) intervals where positive probe returns were encountered. A total of 143 probes were completed; 44 probes were not done because they were considered too far from the probable ship location, or would not contribute to the overall documentation of the site. Tighter interval sampling was also abandoned after consulting with the Principle Investigators from MHT, SHA, and [NHHC] in order to have the majority of the site probed prior to the arrival of the naval support barges. While the basic layout of the shipwreck was captured with the probing that was accomplished, additional probing needs to be completed prior to the construction of the coffer dam to insure that no shipwrecks are impacted by the proposed coffer dam. (Pelletier et al. 2011:75)

6.2 Excavation Units

During the two-week field season, three test units were opened along a central baseline at intervals that were most likely to intersect the ship at diagnostic areas (see above, section 5.7). The units were numbered from south to north, and only Units #2 and #3 contained material related to the shipwreck (Figure 40).

Test Unit #1

The southernmost unit, Test Unit #1, was 2.2 x 1.5 m and ran lengthwise along the baseline. The eastern corners of the unit were situated on the 2 m and 4.5 m marks on the baseline, while the other two corners were projected 1.5 m toward the western shore.

Stratigraphy encountered in this unit included two primary layers. The upper layer consisted of sand-based overburden mixed with organic debris, measuring approximately 75 cm. Objects in this sandy layer included several sticks, branches, leaves, and 20th-

century cultural material (see below, section 6.3). The layer beneath the overburden consisted of sand with intermittent gravel measuring between 30 and 60 cm.

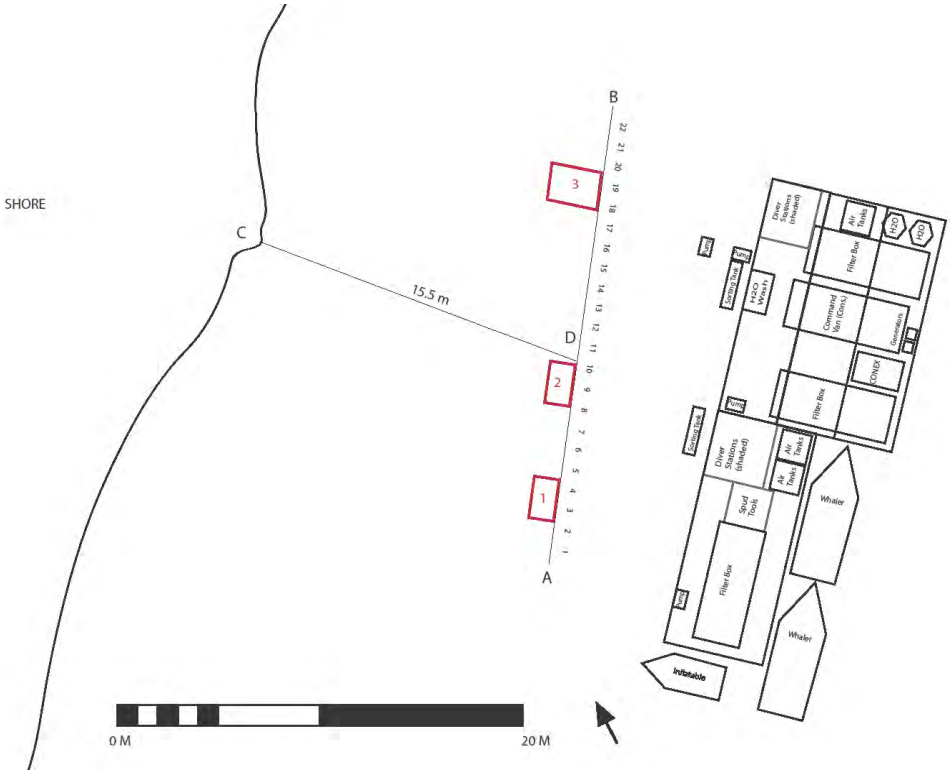

FIGURE 40. Site plan showing location of test units.

No hull timbers were observed in this test unit. After three days of excavation and upon reaching a depth of 135 cm, archaeologists probed the bottom of the unit to see if any substantial material or structural elements existed further down. This probing was done using a 3-m section of steel rebar and testing was conducted throughout the unit along a grid pattern. Approximately 10 evenly spaced probe tests were taken over the entire test pit, with each one resulting in a negative or non-contact hit. The lack of firm contact suggested that Test Unit #1 was likely not situated over the wreck.

Artifacts contemporary with the War of 1812 were not located in this unit, but cultural material from later periods was uncovered. All artifacts collected originated from the overburden layer, approximately 75 cm below the river bottom; no material was discovered below that depth.

Test Unit #2

Based on the results from Test Unit #1 and coupled with the data from the second set of hydro-probe testing, a third test unit was placed between the two existing excavation areas. Test Unit #2 was also 2.2 x 1.5 m wide and ran lengthwise along the baseline. The

eastern corners of the unit were situated on the 7.8 m and 10 m marks on the baseline, while the other two corners were projected 1.5 m toward the western shore. Work in this unit lasted 5 days and reached a final depth of 1.8 m below the river bed.

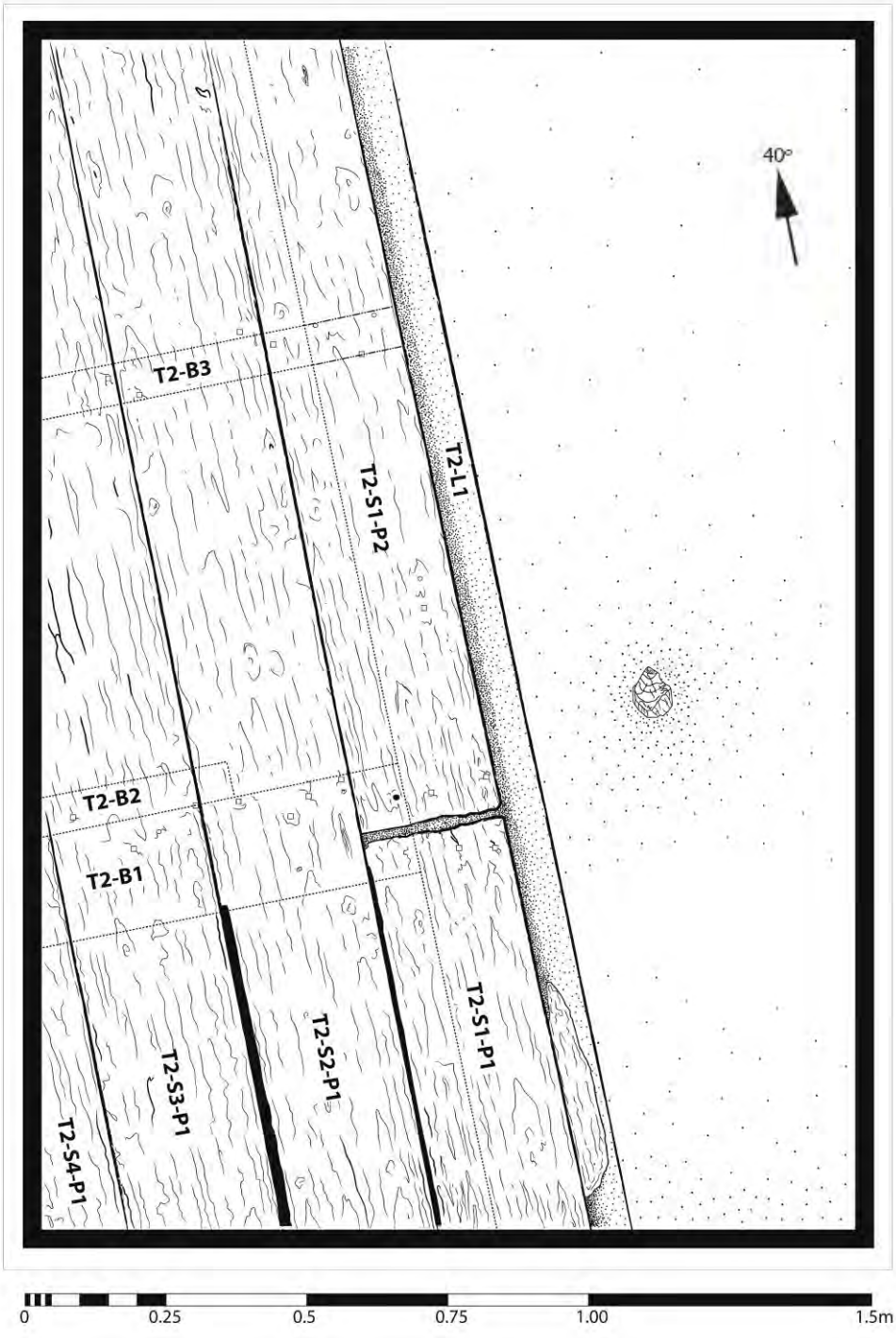

FIGURE 41. Test Unit #2 site plan with timbers labeled.

Stratigraphy encountered in this unit included four primary layers. The upper layer consisted of sand-based overburden heavily mixed with organic debris measuring 75 to 80 cm. Objects in this sandy layer included sticks, branches, leaves, and 20th-century refuse. The layer beneath the overburden consisted of sand with intermittent gravel measuring 30 to 60 cm. The third layer was composed of sand with chunks of dense clay, measuring between 5 and 10 cm. The fourth observed layer was composed of sand and extended approximately 30 cm beneath the uncovered timbers.

Hull timbers were observed in this test unit at approximately 1.8 m below the riverbed. Prior to excavation, aluminum shoring was placed inside the unit so that archaeologists could dredge while the walls were held back in place. The timbers appeared on the western side of the unit running lengthwise at a 40°-220° magnetic axis, and consisted of a small section of planking composed of four total strakes (Figure 41). The eastern half of the unit was void of similar architecture, save for one disarticulated timber jutting up out of the sediment.

Each plank was uniform in shape and size, with the strakes running the entire length of the test unit. The planks measured 24–27 cm (9½–10½ in.) wide by 2 cm (¾ in.) thick, and were secured with iron fasteners onto two transverse timbers, likely deck beams, on their underside. The structural integrity of the planking timbers was considerable, with each one exhibiting very limited damage or wear (Figure 42). The easternmost strake was unique in that it featured a simple butt-joint where two separate pieces of planking came together (T2-S1-P1 and T2-S1-P2). Wood specimens were not taken for identification, but on-site analysis and historical research suggest the softwood planks were likely constructed of pine.

FIGURE 42. Well-preserved ends of planks T2-S1-P1 and T2-S1-P2. (Courtesy of Naval History and Heritage Command.)

Along the underside of the easternmost planking strake was a larger longitudinal timber, possibly a beam shelf. This plank (T2-L1) was more robust than the strakes described above, measuring 24 cm (9½ in.) wide by 6 cm (2¼ in.) thick. The timber also protruded slightly out from the eastern strake, forming a lip or edge in plan and profile view. It was along this edge that 3 large iron fasteners were present, protruding upward from the timber's underside. The longitudinal timber itself was secured to the strake above with nine iron fasteners; it was also likely attached to other structural supports not viewed in the unit.

There were a total of three transverse timbers, which appear to be beams, found on the underside of the planking strakes, one on the northern side and two on the southern. The far southernmost beam (T2-B1) was substantially larger in width than the other two, measuring 24 cm (9½ in.) sided by 6 cm (2¼ in.) moulded by 62.5 cm (24½ in.) long (observed). The planking strakes were secured to this large transverse timber by seven iron fasteners, three on T2-S3-P1 and four on T2-S2-P1. There was a fastener hole in T2-S2-P1 which had secured that plank to T2-B1, but the nail was missing. Running parallel to this timber along its northern edge was a small companion transverse timber (T2-B2). This timber measured an average of 6.25 cm (2½ in.) sided by 6 cm (2¼ in.) moulded by 33.5 cm (13¼ in.) long (observed), and had one iron nail driven from above through plank T2-S3-P1. Further north of these two pieces, at a distance of 66 cm (26 in.), was the third beam (T2-B3). This timber was similar in size to T2-B2 and measured 7.25 cm (2¾) sided by 9 cm (3½ in.) moulded by 64 cm long (25¼ in.) (observed). The planking strakes were also fastened to this lateral support with a total of eight iron nails.

There were two types of iron fasteners present in the timbers from Test Unit #2. The first type was a square iron nail with a square head measuring 2 cm (¾ in.) and length approximately 8 cm (3¼ in.). Seventeen of these nails were seen fastening the planking strakes to the transverse timbers, while six nails secured the eastern strake to the longitudinal timber underneath. The nails were primarily driven into the planking from above, but there were five instances where the nail was driven in from the underside of the transverse timber: three joining T2-S1-P1 to T2-L2, one joining T2-S3-P1 to T2-B1, and one joining T2-S2-P1 to T2-B3. The second type of fastener observed was a larger iron nail measuring 2 cm (¾ in.) at its head and 17 cm (6¾ in.) in length. Only three of these nails, or small spikes, were found, and all were exclusively on the lip of the robust longitudinal timber (T2-L1). All three of these fasteners were nailed from the underside of the thick timber and stood proud of its surface, in addition to exhibiting some deformation due to wear. Chemically speaking, all of the iron nails in Test Unit #2 were experiencing a certain degree of degradation and corrosion, but still remained fairly intact.

In the eastern area of the test unit, devoid of articulated ship timbers, one detached piece of wood protruded from the bottom. This timber was somewhat rectangular in section, measured 8.13 cm (3¼ in.) wide by 5.24 cm (2 in.) high, and was very badly degraded. It was impossible to ascertain a total length on the timber, as it penetrated too deeply and at too much of an angle into the bottom to get a proper measurement. As excavation in this

part of the unit continued, the exposed upper portion of the timber, measuring 40.39 cm (16 in.) in length, separated from the rest of the piece after losing its sedimentary support matrix. The timber fragment was recovered by archaeologists and sent to the NHHC Archaeology and Conservation Laboratory on the Washington Navy Yard for treatment (Figure 43). The fragmentary piece exhibits a good deal of wear and degradation, but notable features are still present, namely part of a bore/fastener hole on its anterior end and a small square iron nail on its upper surface.

FIGURE 43. Face and anterior end of timber recovered from Test Unit #2. (Courtesy of Naval History and Heritage Command.)

To help establish location on the shipwreck, archaeologists used a 3-m iron rebar probe to estimate the depth of hold and position port or starboard of the vessel's centerline. This was performed at the eastern half of the test pit where no structural timbers were present. A series of probes, sections A, B, C, and D, were taken along the length of the beam shelf (T2-L1) at either end as well as the centermost point within the test pit (Figure 44). These probes were done at 90° angles as well as 20°, 30°, 40°, and 45° angles on both the western and eastern sides, dependent upon space restrictions within the aluminum shoring. These depths were plotted out to determine possible turn of the bilge measurements.

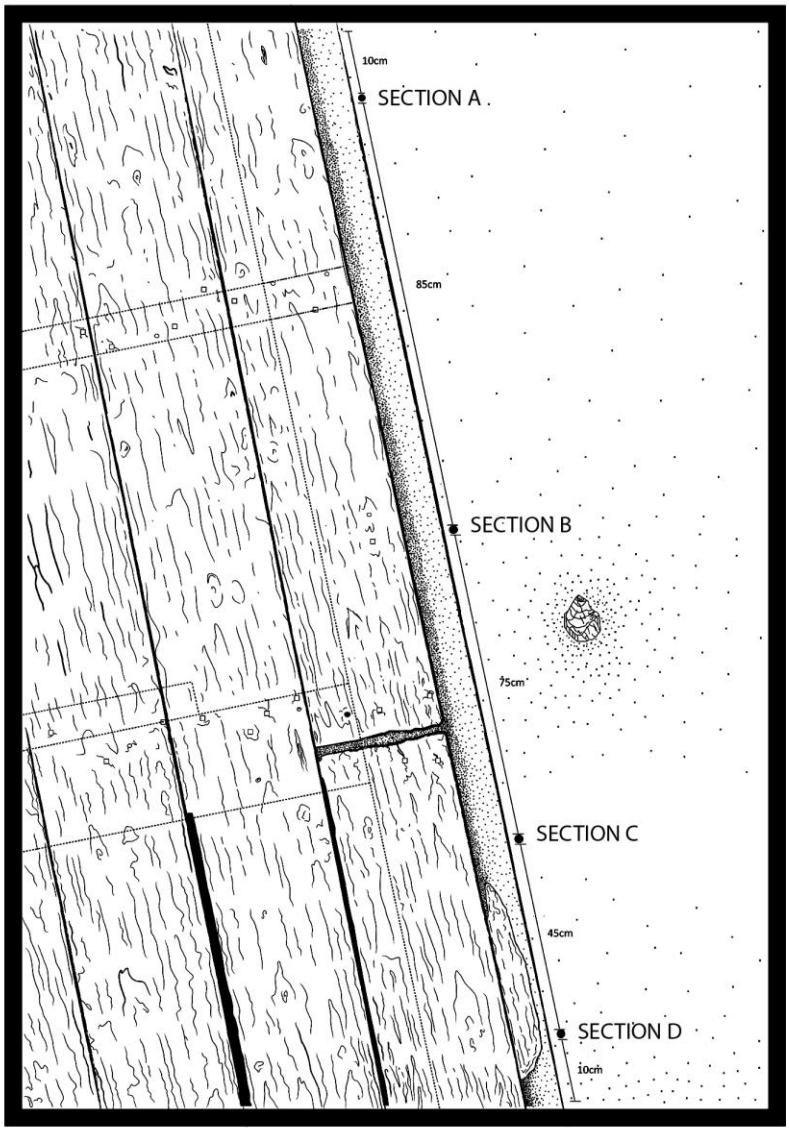

FIGURE 44. Location of sectional probes in Test Unit #2.

The profile drawings of sections A, B, C, and D (Figures 45-48) provide an indication of depth of hold, though not turn of the bilge. Probes on either side of the beam shelf at 30° and 45° extended to maximum of 138 cm, but due to the inability to reach more obtuse angles, did not provide sufficient data to determine extensive turn of the bilge hull characteristics. Contact was made at a minimum of 70 cm and a maximum of 106 cm directly below the beam shelf, revealing the presence of wood at varying depths beneath the beam shelf. The exact nature of the contact, however, cannot be determined without further investigation. The results of the probe data and the location of the deck beams demonstrate that the area west of the beam shelf, which resulted in contacts of a somewhat shallower depth, likely indicate a position on the shipwreck west of the centerline.

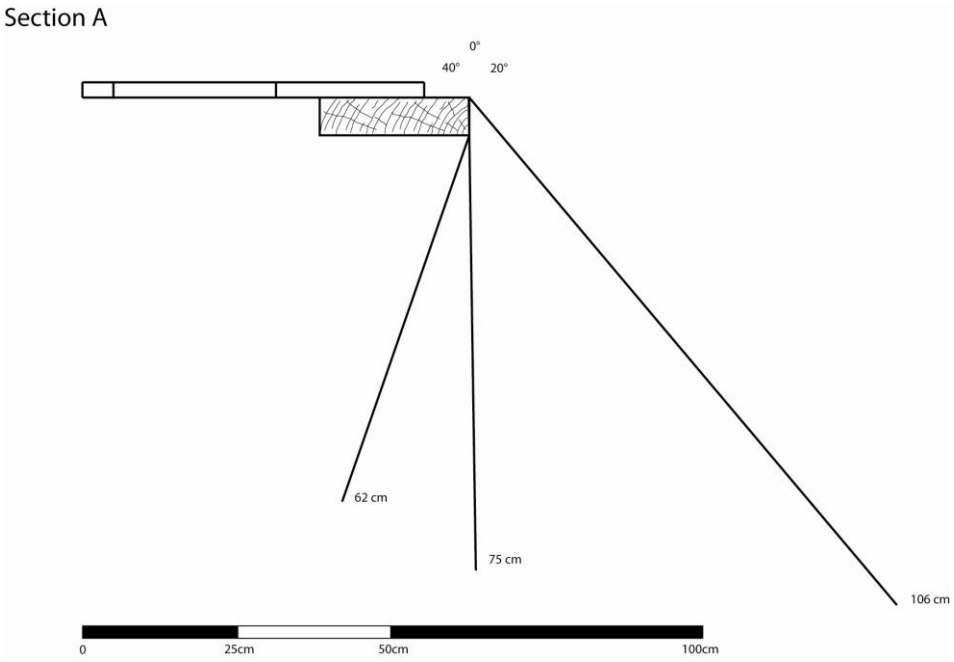

FIGURE 45. Section A.

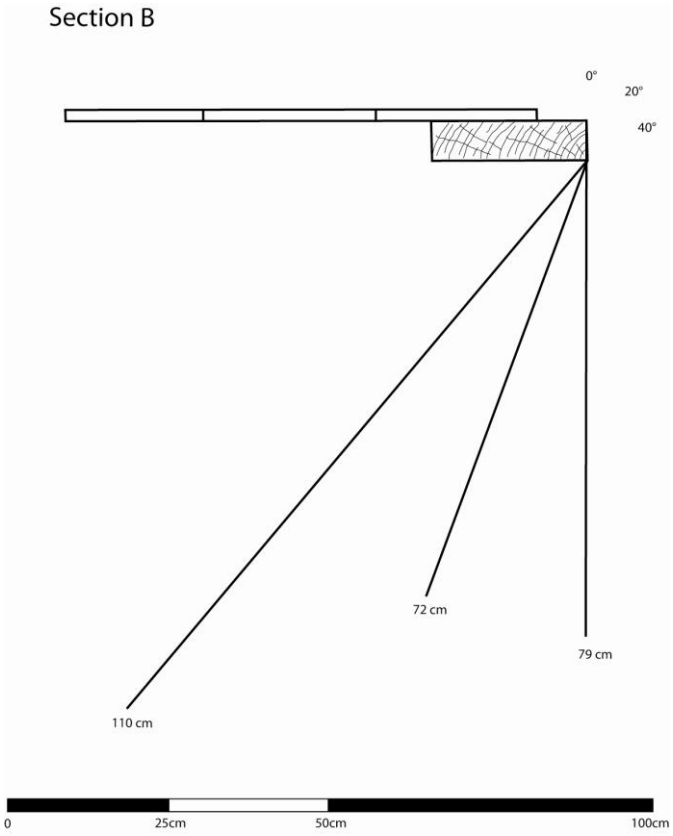

FIGURE 46. Section B.

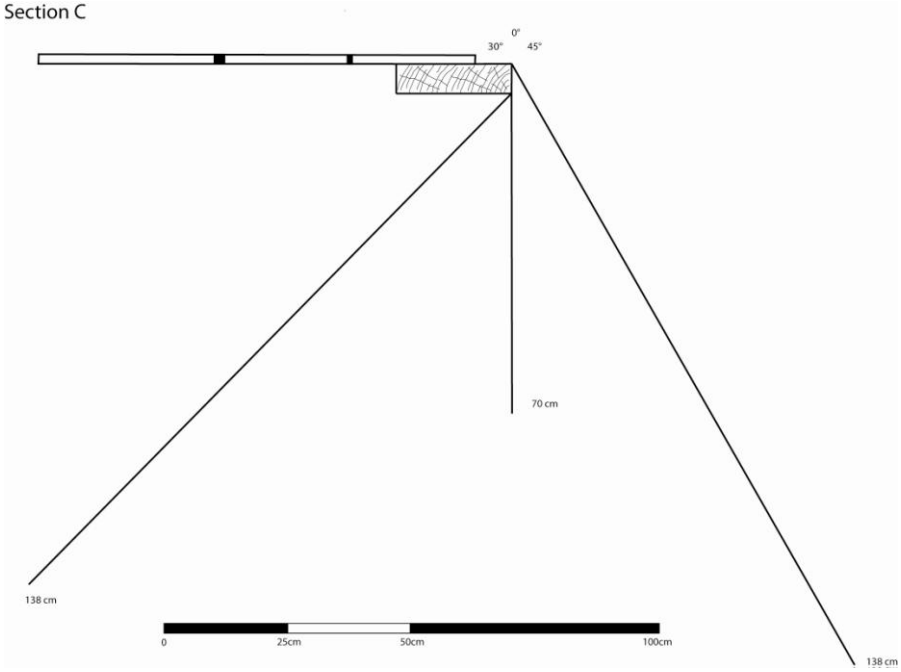

FIGURE 47. Section C.

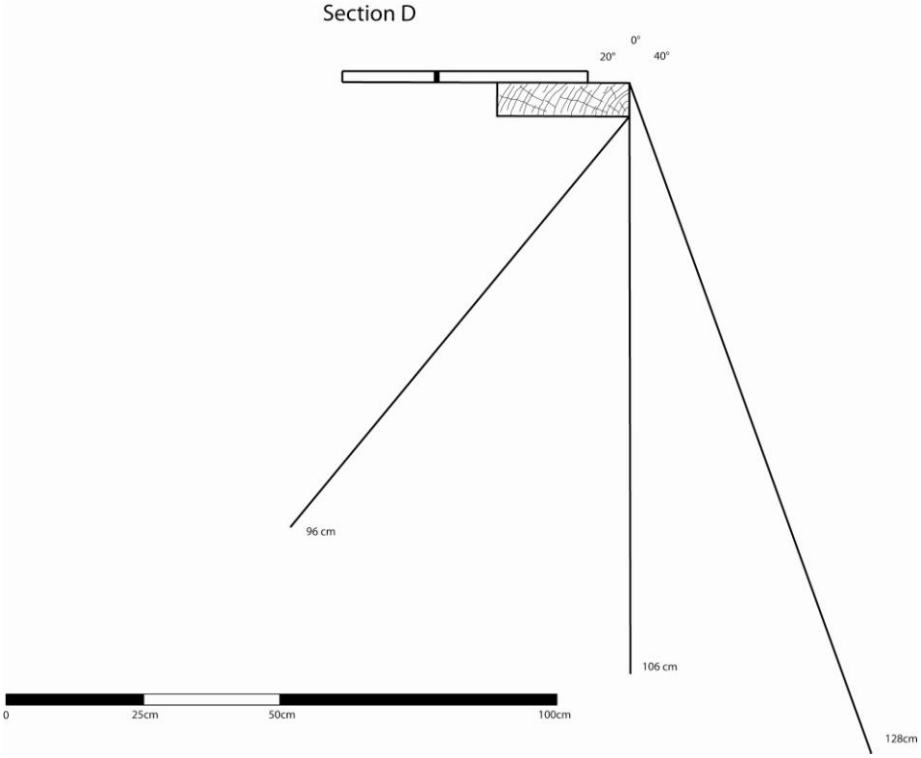

FIGURE 48. .Section D.

Archaeological data thus far collected and compared with previous test excavations and drawings by Donald Shomette (Figures 49 and 50) reveal that the approximate location of Test Unit #2 is in the well-preserved section of deck at the edge of the hold. Comparing the drawing produced by Shomette with this year's Test Unit #2 site plan, the location and size of recorded timbers as well as nail patterning match fairly closely. The approximate turn of the bilge measurements recorded beneath the starboard deck beams seem to reinforce this location, though excavation is required to obtain accurate hull curves as well as detailed construction features.

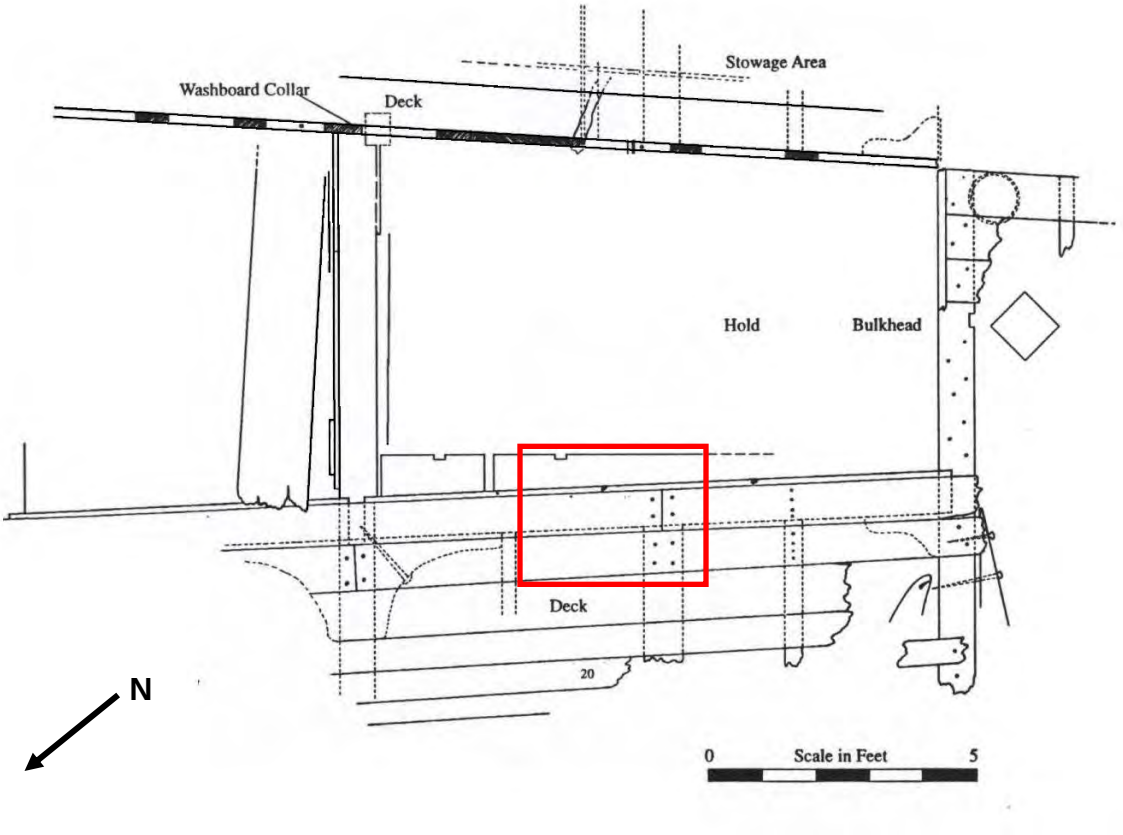

FIGURE 49. Plan view of hold as excavated by Donald Shomette with probable location of Test Unit #2 (after Shomette 1996a: 47).

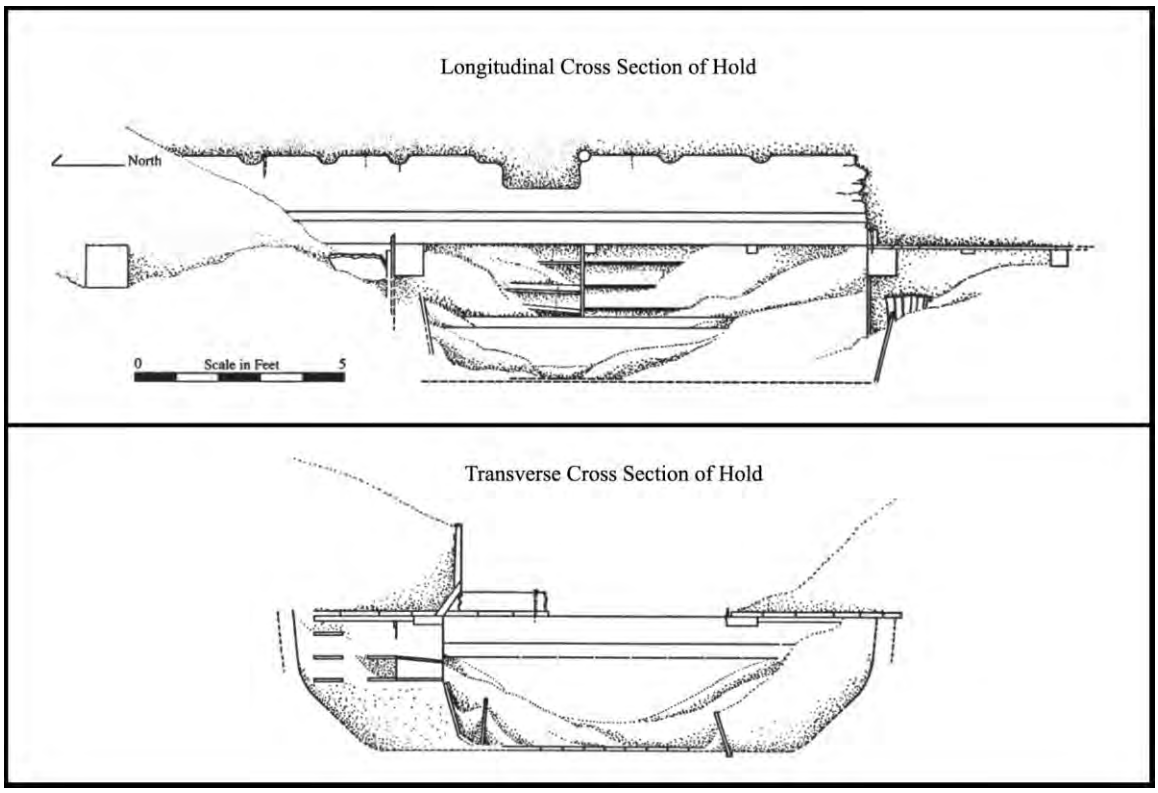

FIGURE 50. Longitudinal and transverse cross sections of hold as excavated by Donald Shomette (Shomette 1996a:48).

Test Unit #3

The northernmost test unit, designated as Test Unit #3, was 1.84 x 1.16 m, and also ran lengthwise along the baseline. The eastern corners of the unit were situated on the 17.46 m (57 ft.) and 19.3 m (63 ft.) marks on the baseline, while the other two corners were projected 1.16 m toward the shore. Excavation in this unit was performed over a period of eight days and reached a final depth of 2.7 m. Although the use of aluminum shoring was also planned for this unit, complications with the availability of material prevented the team from delineating the unit in this manner. To compensate for the lack of shoring, a robust wooden box measuring approximately 1 x 2 m was constructed, but was not able to be permanently stationed over the unit due to buoyancy issues. URS and MHT archaeologists instead drove four 0.6-m PVC pipes into the riverbed, marking the limits of the unit, then excavated as much of the area as possible with the dredge. The size of the uncovered unit was limited, however, by the sheer amount of sediment overburden.

Stratigraphy encountered in this unit included three primary layers. The upper layer consisted of sand overburden heavily mixed with organic debris measuring approximately 100 cm. Fairly consistent with the stratigraphy of Test Unit #2, objects in this sandy layer included sticks, branches, leaves, hickory and black walnut shells, and 20th-century debris (including Pabst 16-ounce beer cans). The layer beneath the overburden again was comprised of sand with intermittent gravel measuring between 120

and 150 cm. At approximately 2.5 m, a thick (10 cm) layer of clay was encountered. This clay, mixed with gravel, was found to overlay the deck planking of the shipwreck (Pelletier et al. 2011:62).

Hull timbers were observed in this test unit 2.7 m below the riverbed. Unlike Test Unit #2, these timbers were situated throughout the entirety of the unit running lengthwise along the same 40°-220° magnetic axis. The uncovered timbers also exhibited a similar section of planking composed of four complete strakes and two broken ones, secured to the topside of two transverse timbers (Figure 51).

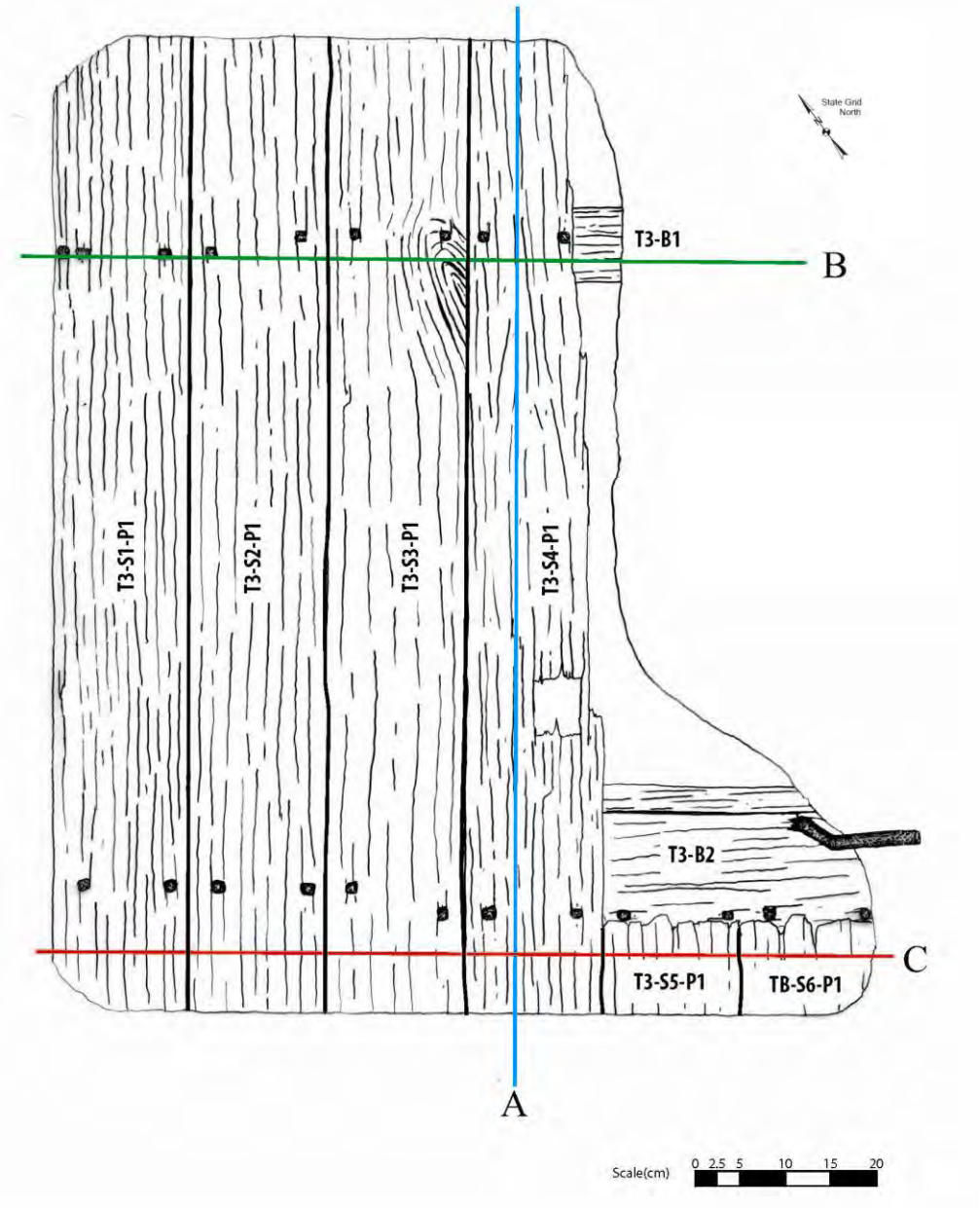

FIGURE 51. Test Unit #3 site plan (Pelletier et al. 2011:72).

Each plank was uniform in shape and size, with the strakes running the entire length of the test unit. The planks measured, on average, 15 cm (6 in.) wide by 3 cm (1¼ in.) thick and were secured with several iron fasteners to two transverse timbers on the underside of the planking. The structural integrity of the planking timbers was considerable, with each one exhibiting very limited damage or wear. The two westernmost strakes were unique in that they were both completely broken off north of transverse timber T3-B2 while all other planks remained intact. A square hole, approximately 5 cm (2 in.), was found in plank T3-S4-P1. It appeared to be fresh and was possibly created during the hydro-probe testing. Wood specimens were not taken for identification, but on-site analysis and historical research indicated the softwood planking, like that in Test Unit #2, was likely pine.

There were two primary transverse timbers in the test unit, one on the northern side and one on the southern, separated by a distance of 56 cm (22 in.). The southern timber (T3-B1), likely a deck beam, was the smaller of the two and nearly square-shaped in section, measuring 6 cm (2¼ in.) moulded by 8.5 cm (3¼ in.) sided by 62.5 cm (24½ in.) long (observed). The northern beam (T3-B2), in contrast, was much larger and uniquely fashioned in the shape of an inverted T. The maximum dimensions of this timber equaled 17 cm (6¾ in.) sided and 13 cm (5 in.) moulded, while the minimum sided dimension was 12.5 cm (5 in.).

Square-shafted iron fasteners were used to fasten the planks to the deck beams, and measured approximately 0.5 cm (¼ in.) thick. The heads of the nails measured 1.1 cm (½ in.). Some fastener heads appeared faceted, much like the rose head wrought nails typical of colonial craftsmanship. A bent iron pin, 23 cm (9 in.) long with a diameter of 2.5 cm (1 in.), was observed extending upward from beam T3-B2. The use of this fastener is still unknown.

An opening in the deck planking on the southwestern corner of the unit was discovered during excavation. To help establish in what part of the ship the test unit was located, the dive team used a 3-m iron probe to estimate the depth of hold and position relative to the vessel's centerline. These probes were done at 90° angles as well as 45° angles on both the western and eastern sides. Depth from the opening in the deck planking to the suspected ceiling planking was approximately 1 m. Probes to the western side measured 1.98 m where contact with wood was made. Probes to the eastern side found no contact up to a distance of 3 m. This suggested that the nearest side of the deck terminates a distance of 1.37 m west of the test unit.

Similar to Test Unit #2, artifacts dating from the late 20th and early 21st centuries were encountered throughout the excavation, but not retained in the artifact collection. A lead weight, discussed further below, was discovered at the deck level, close to the iron pin and notch in the deck beam, and may possibly be contemporaneous with the wreck.

6.3 Artifacts Recovered

Artifacts recovered from the site were labeled and kept submerged in source water until they could be transported to the Archaeology and Conservation Laboratory and stored in deionized water or sesquicarbonates with fungicides added as necessary. Each object was designated a field number SCORP-2010-XX. A total of 34 objects were transported to the laboratory for analysis and/or conservation. All objects have been measured, cleaned, recorded, photographed, and placed in the appropriate storage containers. Conservation of the organic artifact specimens has begun, and various molecular weights of polyethyleneglycol are being used for treatment of waterlogged wooden components.

A list of the recovered objects can be found in Appendix B. The most complex artifact encountered, the shipwreck itself, was studied *in situ* and reburied in the most accommodating preservation conditions until the proposed 2012 cofferdam excavation and study.

In all three test units, artifacts dating from the late 20th and early 21st centuries were encountered, most of which were noted and photographed but not retained in the artifact collection. These were found primarily in the overburden layer and are clearly not associated with the wreck. Such items include modern glass alcohol (i.e. beer and liquor) bottles and fragments; fragments of asphalt roof shingles; printed plastic sheeting; clay pigeon fragments; pieces of non-diagnostic, machine-cut softwood; and an assortment of unidentified animal bones.

FIGURE 52. Photograph of Gunther Beer can from Test Unit #1. (Courtesy of Naval History and Heritage Command.)

In Test Unit #1 two mid-20th-century punch-top beer cans were found, one much more degraded and fragmentary than the other. The labeling/manufacturing information on the more complete can could still be discerned, revealing that the can once held Gunther Beer, bottled in Baltimore, MD. The label design dates to the middle to late 1950s (Figure 52).

Several modern artifacts were encountered in deeper stratigraphic levels, attesting to the dynamic formation processes affecting the site. In some cases the heavier items may have moved down in the sediment layers, in others their presence is more closely related to previous human activity at the site, particularly the excavations in the 1980s.

For instance, in Test Unit #2, in the second stratigraphic level (1–1.8 m deep), a U.S. penny was found with the date 1976 printed on it. In Test Unit #3, a torn and deteriorated neoprene dive boot was found positioned on the top layer of dense clay over the hull timbers in the center of the excavation unit, possibly trapped in the backfill from Shomette's team.

In Test Unit #2, starting at the deck level, from 1.8 to 2.8 m deep, several artifacts of historic interest were encountered. These objects include: glass shards of various colors (clear, red, green); three small brick fragments, two small ceramic sherds (redware with brown glaze); a broken animal tooth (mammalian, not yet identified); two pieces of heavily charred culturally modified hardwood; and several pieces of non-diagnostic, possibly culturally modified softwood. These seem likely to relate to the wreck; however, since this unit appears to be in the area already excavated by Shomette, there is a chance that this material was introduced to the site as part of the backfilling operation.

The likeliest candidate for an artifact associated with the original wreck came from Test Unit #3. A small lead artifact, 10 x 1.5 cm, was discovered near the level of the deck planking in Test Unit #3, (Figures 53 and 54). A groove runs around the exterior at the center, and the tapering ends have a slight flare or lip which create a similar grooved space. A small hole runs through the longitudinal axis of the piece with organic residue inside, presumably the remains of a fishing line or net. The shape is similar to net weights from the period but cannot be directly associated with the wreck. It was discovered beneath the clay layer, suggesting it was deposited relatively close to the date of the wreck. It is not unusual to find net weights on wrecks, as nets are easily snagged and lost on the exposed timbers, thus it is possible this weight was deposited at some point after sinking but before it became fully buried. Lead weights are notoriously persistent in form through time, however, making them difficult to date accurately, and due to their density, they can make their way very far down in the soil matrix after loss.

FIGURE 53. Lead fishing weight. (Courtesy of Naval History and Heritage Command.)

FIGURE 54. Detail of central groove on lead fishing weight. (Courtesy of Naval History and Heritage Command.)

7.0 DISCUSSION

Based on the remote sensing, hydro-probe, and test excavations, tentative assumptions can be made about the shipwreck site. The recorded structural remains clearly indicate that the excavated site represents deck structures belonging to an antiquated vessel. Further, the scantling sizes and construction features documented from the two test pits are similar to what would be expected from an early 19th-century row galley or gunboat employed by the U.S. Navy. (See Appendix C for a complete scantling list.)

Several plans survive for gunboats of this period, although most of these are proposed designs submitted to the Department of the Navy and do not necessarily represent the final product. Even when a design was officially approved, Chapelle (1949:305) notes, "[b]ecause of the lack of a central design authority, the shipwrights and officers in the navy yards and contract shipyards felt quite free to depart from the authorized designs and specifications, going so far as to change lines and dimensions." Nevertheless, these early plans are often used to reconstruct dimensions and upper works of archaeologically recovered vessels, since typically only a small portion of the hull survives.

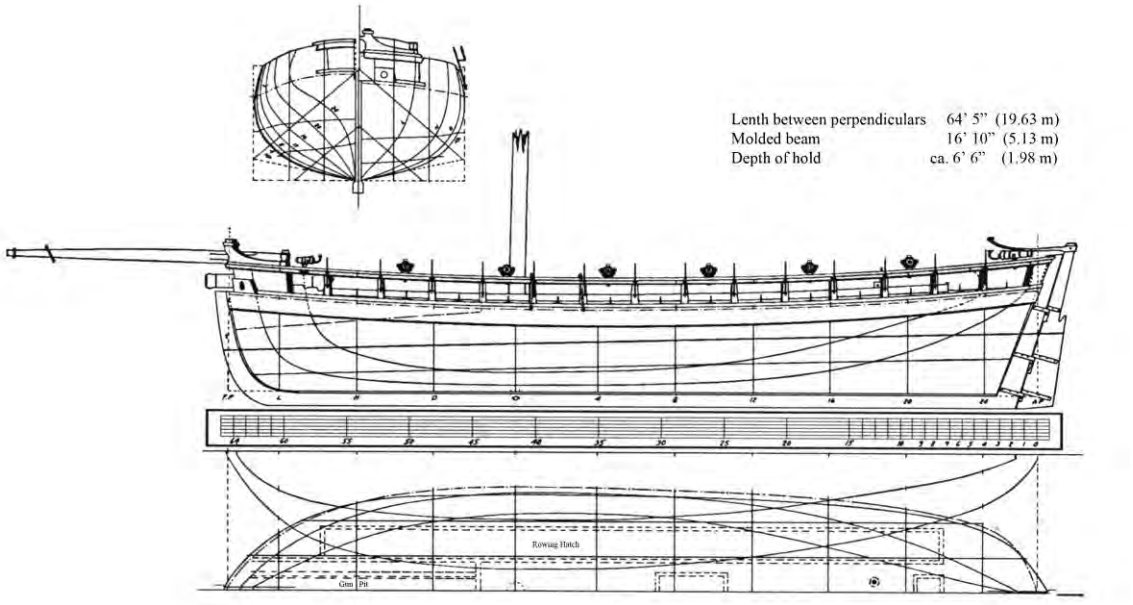

FIGURE 55. Proposed gunboat design by Captain James Barron, ca. 1803. A note on the original document states that the gunboat as built "will be materially different from this draft." (after Chapelle 1949:195).

Two designs in particular are generally used to estimate the size and shape of *Scorpion*. One is a gunboat proposed by Captain James Barron ca. 1803, which may be similar to the original design of Gunboat *59* before it was rebuilt as *Scorpion* (Figure 55). This vessel was 19.63 m (64 ft. 5 in.) in length and 5.13 m (16 ft. 10 in.) in beam. It was designed as a double-ender, able to be both rowed and sailed, with a single long gun in

the bow and 16 swivel guns mounted on the rail (Chapelle 1949:194). This plan, however, was considered experimental and was apparently only followed for Gunboat *2* (Tucker 1993:38); Barron drafted a different design in 1806, not surviving, which was more widely adopted, calling for a ship 18.29 m (60 ft) between the perpendiculars, 17.07 m (56 ft). on the keel, (5.03) 16 ft. 6 in. in beam and a depth of hold of 2.01 m (6 ft. 6 in.) (Tucker 1993:57, Emery 1999:16).

Little is known about the extent of the rebuild effected in 1812. Shomette (1995:63) notes that in correspondence from the period, *Scorpion* is referred to variously as "a gunboat, a large sloop, a block sloop, a cutter, and a topsail sloop." One surviving plan of a block sloop from the period (Figure 56) is therefore often used as a parallel, and its dimensions (length 48 ft. 8 in. [14.83 m], beam 5.54 m [18 ft. 2 in.]) have sometimes been cited as the historical length of *Scorpion* (Mooney 1976:383). Again, however, this was only a proposal, and a finished block sloop may have varied greatly from the design. In the case of *Scorpion*, its origins as a gunboat suggest dimensions closer to that of the Barron design, but after its rebuild, the upper works may have contained some of the features of the block sloop shown in the proposed plans.

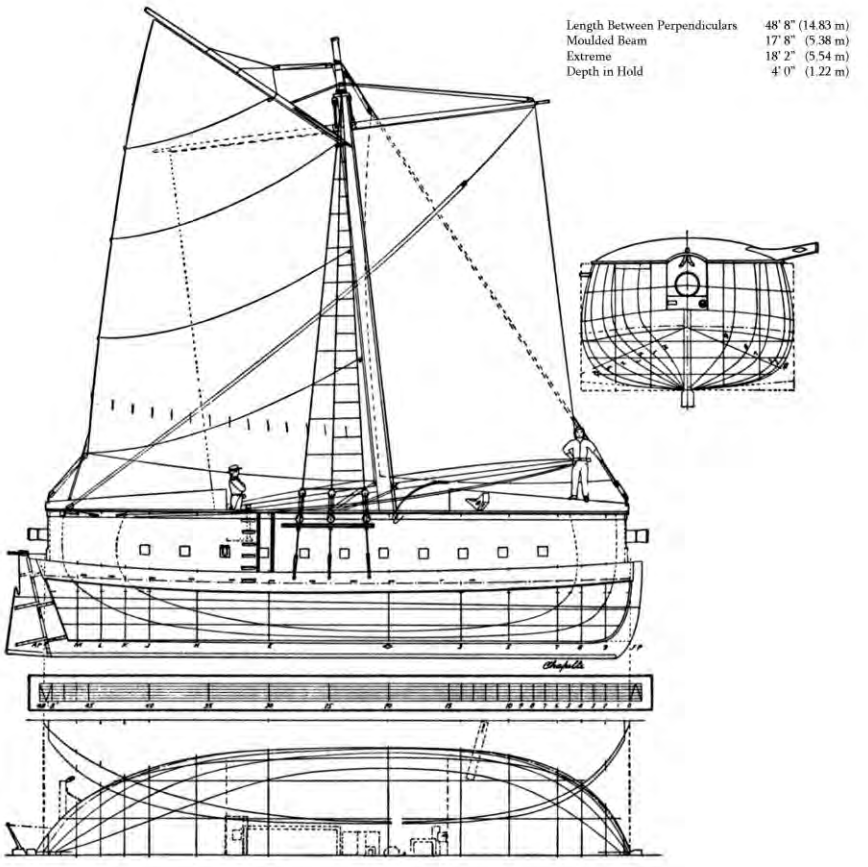

FIGURE 56. Proposed design of a block sloop from the early 19th century (after Chapelle 1949:227)

The chief difference between the two types of boats is that block sloops functioned as a self-propelled floating battery, in which speed under sail or oars was sacrificed to the ability to carry heavy guns. This deviated from the design for row galleys in a few ways. Block sloops had high bulwarks to protect the crews from small-arms fire and to aid in resisting boarders, and they were generally built powerfully for the support of many guns.

Two contemporary vessels recovered archaeologically also serve as valuable parallels to *Scorpion*. First is the War of 1812 row galley *Allen*, in service on Lake Champlain; the second is the wreck designated D1 from St. Leonard's Creek, Maryland, which likely represents the remains of Gunboat *137*, part of the Chesapeake Flotilla.

7.1 Row Galley Allen

Allen was an American row galley built at Vergennes, Vermont, in 1814 by Master Shipwright Noah Brown. The galley operated on the waters of Lake Champlain in the final year of the war and participated in the Battle of Plattsburgh Bay in September 1814. Abandoned in the Poultney River, just above Whitehall, New York, *Allen* was rediscovered in 1981 and subsequently made the subject of an archaeological excavation in 1995 (Emery 2003).

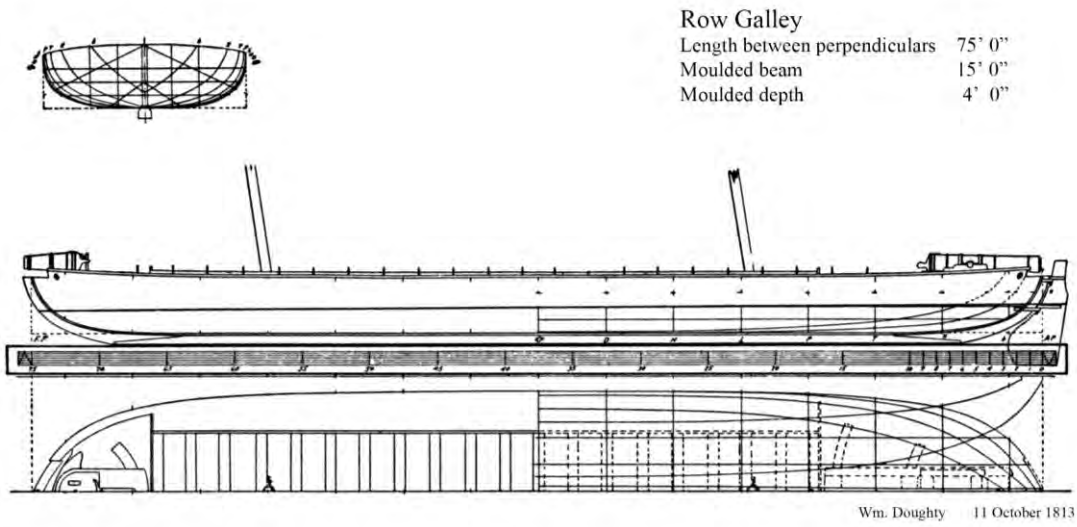

FIGURE 57. Accepted plan for a row galley by William Doughty, 1813 (after Chapelle 1949:277).

Based primarily on plans by shipwright William Doughty (Figure 57), *Allen* provides a good archaeological parallel. The design, dated 11 October 1813, was specifically adapted for use on inland waters such as Lake Ontario, Lake Champlain and the Chesapeake Bay (Chapelle 1949:276). Brown made his own modifications as necessity dictated, but had explicit instructions to fabricate his galleys on Lake Champlain using the same general hull form and construction specifications as those already operating on

Chesapeake Bay (Emery 2003:275). Though most likely based on the earlier Barron design, *Scorpion* would have had similar characteristics to *Allen*, as the overall function and operation of the vessels were analogous.

Despite variances in design of the upper works such as the addition of high bulwarks on *Scorpion*, the comparison of hull construction features remains valid for study since they were based on similar prototype designs. *Allen*'s design was of larger proportions, however, with a keel measuring 21.11 m (69 ft. 3 in.) long, compared with *Scorpion*'s probable keel length of 17.07 meters (56 ft.).

Doughty recommended a double-ended vessel in his row galley plans. In such a design, the rudder would likely be one of only few structural features distinguishing bow from stern. Brown altered Doughty's design, however, by fitting a straight sternpost which allowed for a fast and simple way to hang the rudder (Emery 2003:240). Barron's plans likewise included an angled sternpost, which would allow for determination of *Scorpion*'s stern section should components of the sternpost survive in the archaeological record, as was the case for the remains of *Allen* (Figure 58.)

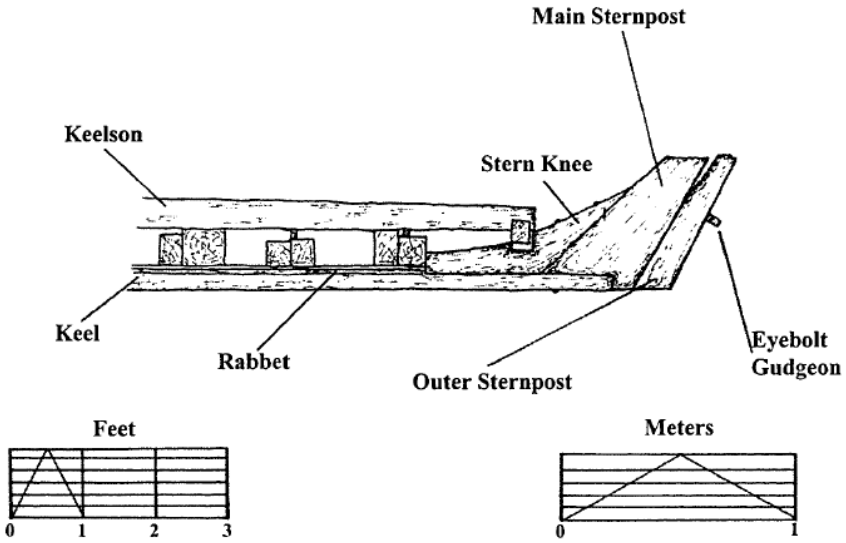

FIGURE 58. Archaeological remains of *Allen*'s stern assembly. (Emery 2003:Fig. 65).

While frames have not yet been uncovered and studied from *Scorpion*, archaeological evidence from *Allen* revealed frames with five overlapping pieces mostly cut from white oak (*Quercus alba*). Through bolts and drift bolts were alternately used to fasten the frames to the keel. Floor timbers ranged from 9.89 cm (3½ in.) moulded by 12.70 cm (5 in.) sided to 15.24 cm (6 in.) moulded by 19.69 cm (7¾ in.) sided. The spacing between frames averaged between 0.6 and 0.8 m (2 ft. and 2 ft. 6 in.) (Emery 2003:247).

Allen's surviving external planking, ceiling, and transverse planking were also recorded during the excavation. The garboard strake measured between 22.9 and 29.2 cm (9 and 11½ in.) along the length of the keel, and measured 2.5 cm (1 in.) thick. Ceiling planking of white pine (*Pinus strobus*) was attached with either two square or T-head nails to each frame, and ranged between 16.5 and 39.4 cm (6½ and 15½ in.) wide and 1.9 and 2.5 cm (¾ and 1 in.) thick. Wooden battens extended along the starboard edge of the keelson toward the turn of the bilge which could have been used to hold bulkheads in place that may have used to partition storage areas in the hull (Emery 2003:251). There is some evidence from current and previous excavations that the hull of *Scorpion* possessed similar structures to help support partitioning bulkheads, though the exact manner of support and associated dimensions are not yet known.

Allen's construction also featured battens to support large boards which were surmised to have been used to level the bottom of *Allen's* hull alongside the keelson either to provide a walking surface for the crew or to provide a level surface within a compartment in the hold (Emery 2003:252). A similar design might be expected on the open-decked block sloop. Transverse decking was also recorded near the stern at the level of *Allen's* keelson, averaging 22.9–31.1 cm (9–12¼ in.) wide and 1.9–2.5 cm (¾–1 in.) thick, and fastened to the keelson with 2.5 cm (1 in.) square iron spikes. These were situated 10.2–12.7 cm (4–5 in.) above the ceiling planking, and provided a clear walking surface for the galley's crew in the stern area (Emery 2003:252). An 1805 list of dimensions and materials for a gunboat from Josiah Fox calls for "[a] platform to be laid on the keelson from the foremost bulkhead of wardroom to the aftermost bulkhead of cabin and a board on each side to be left loose to deposit shot on the ceiling." (Chapelle 1949:529). It is possible that similar transverse decking is present on the remains of *Scorpion*, and was detected by the rebar probing in Test Units #2 and #3.

Allen was balanced with a combination of pig iron ballast scattered on either side of the keel, as well as additional cast iron ballast found in the stern area to counterbalance the 1,723-kg (3,800-lb) long 12-pounder mounted on the galley's bow.

Allen's keel measured 15.24 cm (6 in.) moulded and 29.21 cm (11½ in.) sided at the maximum extents. The keelson measured 13.97 cm (5½ in.) moulded by 26.67 cm (10½ in.) sided maximum. Row thwarts/deck beams discovered on the wreck site measured 8.89 cm (3½ in.) moulded by 25.4 cm (10 in.) sided. The major deck beams recorded from the *Scorpion* site measured 6.35 cm (2½ in.) moulded by 24.13 cm (9½ in.) sided, while dimensions of support beams and other components ranged from approximately 6.35 to 8.89 cm (2½ to 3½ in.) moulded by 6.35 to 7.62 cm (2½ to 3 in.) sided.

While *Scorpion's* likely overall length between perpendiculars, at 19.63 m (64 ft. 5 in.), was approximately 1/6 shorter than that of *Allen*'s, at 22.96 m (75 ft. 4 in.), the moulded beams were 5.13 m (16 ft. 10 in.) and 4.65 m (15 ft. 3 in.) respectively. The disparity of the length to beam ratios between the two War of 1812 gunboats, 4:1 for *Scorpion* and 5.02:1 for *Allen*, had to do with both the desired function of the vessel as well as the use on shallow shoals versus a lake environment. The bulkier proportions of *Scorpion* reflected its use as a floating battery in shallow waters while the elongated construction

of *Allen* was probably intended for speed on the lakes. Despite the proportional differences, the data recovered from the Lake Champlain row galley gives an idea of the general characteristics which might be expected on Barney's flagship.

7.2 Gunboats 137 *and* 138

Surveys conducted in 1996 by Shomette and MHT in St. Leonard's Creek located what could be the remains of gunboats *137* and *138*, which were part of the Chesapeake Flotilla. The ships were scuttled side by side off of old St. Leonard's Town peninsula on 26 June 1814 to prevent British capture (Shomette 1997:98).

The remains of Vessel 1 were reported as those of a wooden vessel with flush planking fastened with iron spikes similar to those observed on the *Scorpion* site. Sonar investigations revealed a wreck site with a length of 16.92 m (55 ft. 6 in.) and width of nearly 4.57 m (15 ft.), which approximate the dimensions from shipwright William Price's gunboat plans from which *137* and *138* were built. A bowsprit and coil of tarred cordage were removed from the site by the Maryland Derelict Removal Program in the early 1970s, indicating this boat was a sailing vessel.

Barney utilized a number of barges in his flotilla in addition to block sloop gunboat *Scorpion*, schooner *Ash*, and row galley *Vigilant*. Correspondence from the period indicates that Gunboats *136* to *145* were to have the dimensions cited in Barron's 1806 plan, although it has been suggested they were built to or altered in accordance with a plan by Edward Preble (Chapelle 1949:225; Tucker 1993:61; Emery 1999:17-24). As with the block sloop *Scorpion*, however, there was variation in the construction of the gunboats as compared to the design on paper.

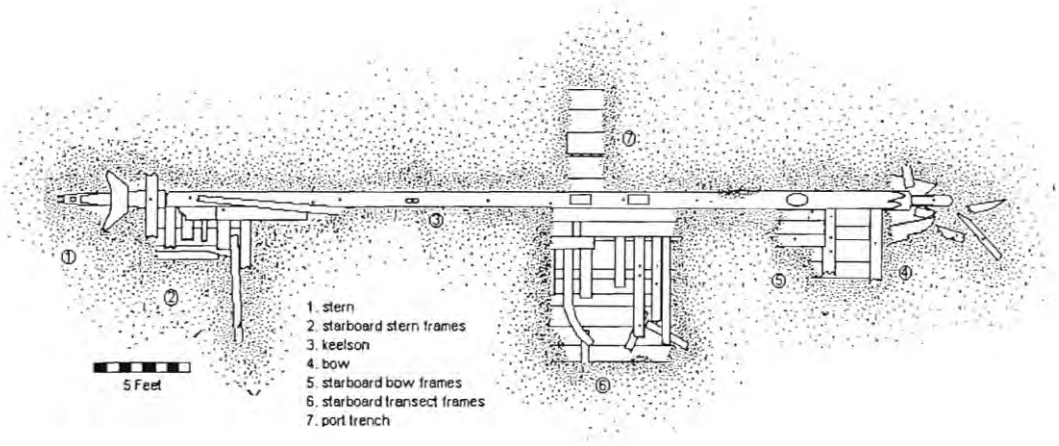

FIGURE 59. Site plan of Saint Leonard's Creek Vessel D1 (Babits and Enright 1998:Fig. 1).

Under the direction of Lawrence E. Babits, PhD., an archaeological investigation was conducted in the summer of 1998 at the site in St. Leonard's Creek, designated 18CV414 (Babits and Enright 1998). The remains of one vessel, designated D1, were archaeologically examined and made the topic of an MA thesis by Jeffery Enright (Enright 1999). Limited dredging of the site was performed in order to expose the stem, sternpost, keelson, keel, framing pattern, and other features for documentation (Figure 59).

The sternpost (Figure 60) was not attached to the vessel and was recovered for study and conservation. Grooves and impressions on the sternpost and keel showed that fishplates and stopwaters were used for fastening, similar to evidence recovered from USS schooner *Ticonderoga*, which sank in 1814. The stern was apparently built up with deadwood, which became shallower throughout its length. Two Y frames were found on top of the deadwood, one *in situ* and one disarticulated. Surviving evidence suggests that an anchoring bolt was driven through the disarticulated frame, possibly through the deadwood (Babits and Enright 1998:5). The end of the keelson was located just forward of the deadwood.

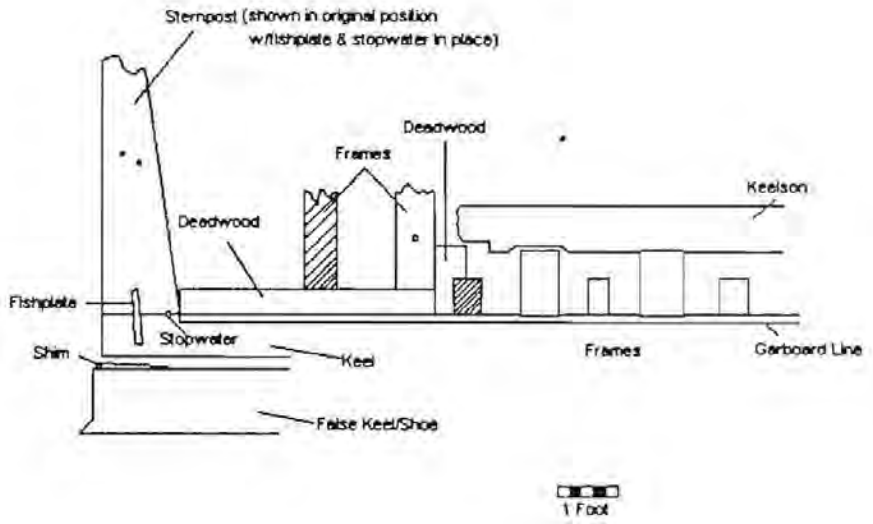

FIGURE 60. Stern assembly of Vessel D1 at St. Leonard's Creek (Babits and Enright 1998:Fig. 2).

Garboard strakes were found twisted almost vertically as the hood ends entered the rabbet on the heel of the sternpost. They measured 41.91 cm (16½ in.) wide by 4.45 cm (1¾ in.) thick at the aft ends. Outside the starboard garboard was found a timber measuring 8.89 cm (3½ in.) wide by 3.81 cm (1½ in.) thick, which Babits and Enright call a possible wale. A second strake was found above the vertical garboard measuring 29.21 cm (11½ in.) wide by 5.08 cm (2 in.) thick.

A keel with a molded dimension of 32.39 cm (12¾ in.) was found at both the bow and stern. It was sided 10.16 cm (4 in.) at the top, but expanded to 13.34 cm (5¼ in.) at the skeg. A large shoe, this false keel was used to protect the keel from groundings, improve sailing characteristics, and strengthen the vessel longitudinally. The recorded dimensions of the vessel's keel at the aft strakes were 17.78 cm (7 in.) sided with a 4.45 cm (1¾-in.) rabbet for the garboards, with a sided dimension of 10.16 cm (4 in.) (Babits and Enright 1998:6-7).

At the starboard section six framing timbers were exposed and studied, including two floors, three first futtocks, and one second futtocks. The keel in this area measured 15.24 cm (6 in.) sided. The keel and keelson were slightly notched to accept the floors. The first floor measured 33.02 cm (13 in.) molded, while the second floor measured 22.23 cm (8¾ in.) sided. The maximum measurements of the two disarticulated futtocks varied, with the first measuring 15.24 cm (6 in.) sided by 17.15 cm (6¾ in.) molded; the second measured 10.16 cm (4 in.) sided by 17.15 cm (6¾ in.) molded. The third futtock, still attached to the vessel, measured 15.56 cm ($6^{1}/_{8}$ in.) sided by 17.15 cm (6¾ in.) molded. Maximum recorded lengths were 74.30 cm (2 ft. 5¼ in.), 66.04 cm (2 ft. 2 in.), and 114.3 cm (3 ft. 9 in.) respectively. One second futtock was disarticulated and measured 165.10 cm (5 ft. 5 in.) long, 12.70 cm (5 in.) sided, and 15.24 cm (6 in.) molded (Babits and Enright 1998:7-8).

Two ceiling planks were discovered in their original locations with an additional plank, measuring 10.16 cm (4 in.) wide by 3.81 cm (1½ in.) thick, running across the keelson at an angle. The aft plank measured 113.03 cm (3 ft. 8 ½ in.) long, 21.59 cm (8½ in.) wide and 4.76 cm ($1^{7}/_{8}$ in.) thick (maximum). The second plank measured 152.40 cm (5 ft.) long, 20.32 cm (8 in.) wide, and 4.13 cm ($1^{5}/_{8}$ in.) thick.

The recorded length of the keelson was 12.29 m (40 ft. 4 in.). Sided dimensions varied from 22.86 cm (9 in.) at the stern to 27.94 cm (11 in.) at the bow. Recorded molded dimensions were 22.86 cm (9 in.) where accessible. Iron drift bolts fastened the keelson to frames and keel, though without an apparent pattern. The concreted remains of a possible driftpin, approximately 4.27 m (14 ft.) aft of the keelson's forward end, may indicate the former presence of a stanchion for supporting a heavy weight. Two mast steps were located 0.61 m (2 ft.) apart along the keelson at baseline measurements 12.42 m (40 ft. 9 in.) and 13.39 m (43 ft. 11 in.). They measured 35.56 cm (14 in.) long by 12.70 cm (5 in.) wide by 12.70 m (5 in.) deep. It was suggested by Babits that the close proximity may have represented an attempt to improve sailing ability by relocating the mast (Babits and Enright 1998:9-10). Partial remains of a loose knee were also discovered, measuring 100.33 cm (3 ft. 3½ in.) long. The arm of the timber measured 24.13 cm (9½ in.) long.

Bow remains included components of a stem, apron, framing timbers, shoe and planking. The first frame was positioned on top of an apron (Figure 61). Five possible cant frames were also recorded, which illustrate the fullness of the bow.

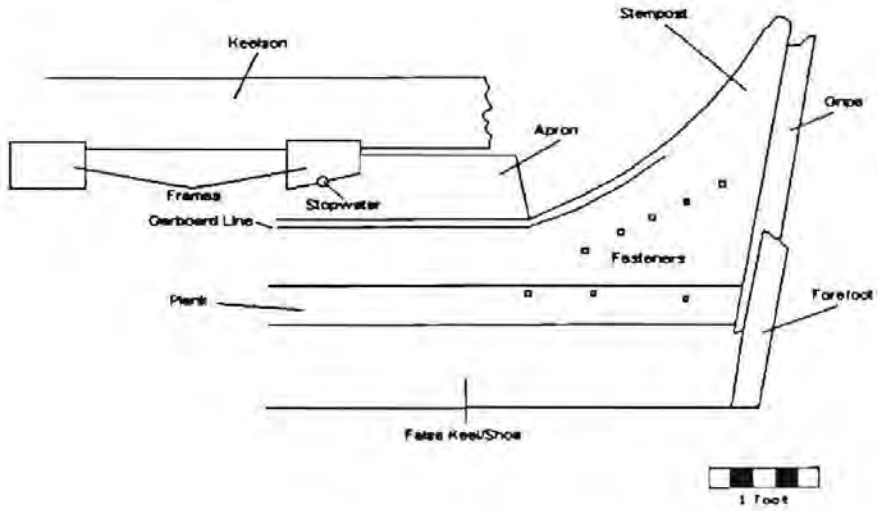

FIGURE 61. Bow assembly of Vessel D1 at St. Leonard's Creek (Babits and Enright 1998:Fig. 4).

Along the starboard side of the vessel several timbers were mapped by the team. Floors were notched to fit over the keel, which was sided 5.08 cm (2 in.) less than the keelson; not all were fastened with drift bolts. Nine outer planks were recorded, ranging in width from 15.24 to 30.48 cm (6 to 12 in.) with one measuring 45.72 cm (18 in.). Three framing timbers were also recorded on the port side, along with five ceiling planks.

Fasteners discovered on the wreck site include a range of iron nails, copper sheathing nails, fishplates, and treenails. The vessel's robust construction could be an indicator of a military vessel. Timber sizes compare with War of 1812 vessels *Linnet*, *Eagle*, and *Ticonderoga*. The boat appears to be flat-bottomed with a hard chine, and little to no deadrise. Based on the archaeological evidence, it was approximately 15.24 m (50 ft.) long by ca. 4.27 m (14 ft.) in beam. Although D1 is not a confirmed Jeffersonian gunboat, it is a prime candidate and a good comparison for Barney's flagship *Scorpion*.

8.0 CONCLUSIONS

Given what we know about the construction of gunboats built for action on the Chesapeake during the War of 1812 and the archaeological data collected over the past 34 years on the Chesapeake Flotilla, it is very possible that the identity of the shipwreck which is the subject of this report is USS *Scorpion*. Until further fieldwork is conducted on the site during 2011, 2012, and possibly 2013, conclusive evidence for identification will have to wait. The characteristics that have so far surfaced, however, give good reason to tentatively identify the wreck site as that of Barney's flagship. The estimated dimensions of the surviving hull are close to the length and breadth of the gunboats designed by Barron. The measured dimensions of the deck planking and corresponding beams approximate those of archaeological data recovered from similarly built naval row galleys used during the War of 1812. Turn of the bilge estimations suggest a boxy construction as expected for Chesapeake Bay flotilla craft. The condition of the wooden structures encountered in the test units reflect those of an early 19th-century boat buried in an anaerobic environment for nearly two hundred years, and the condition of recovered artifacts fabricated from a variety of materials reinforces that reflection based on comparisons with similar archaeological sites. Approximate locations of the deck planking and estimated proximity to the bow and stern reaffirm vessel proportions. Finally, nearly two hundred naval artifacts dating to the early 19th century, including a tin grog cup with the initials of one the flotilla's sailors, provide further evidence that the wreck site is that of *Scorpion*.

Detailed mapping of the site is a priority in order to uncover more features regarding the construction of *Scorpion*. In addition, recovered artifacts will tell us more about life aboard the gunboat, rigging procedures, armament, ballast techniques, battle tactics, provisioning, hull and rigging repairs, and sailing/rowing characteristics. Further hydroprobing is required to determine if other vessels lie nearby. Investigation of targets detected by survey efforts in the Patuxent, which possibly represent other scuttled flotilla vessels, is also necessary. These and a detailed list of other priorities will be the objectives of 2011 and are expected to provide further evidence that the site represents the remains of Joshua Barney's flagship of the Chesapeake Flotilla.

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APPENDIX A
ANALYSIS OF RIVERBED SOIL SAMPLES

Compound	Test Value	Test Unit	Method	Detection Limit
Arsenic	<0.02	mg/l	EPA 6010C	0.02
Barium	0.98	mg/l	EPA 6010C	0.05
Cadmium	0.26	mg/l	EPA 6010C	0.005
Chromium	0.25	mg/l	EPA 6010C	0.01
Lead	<0.01	mg/l	EPA 6010C	0.01
Mercury	<0.0005	mg/l	EPA 7470	0.0005
Selenium	0.034	mg/l	EPA 6010C	0.02
Silver	<0.02	mg/l	EPA 6010C	0.02

APPENDIX B
ARTIFACTS RECOVERED

Field Number	Trench	Artifact Description	Status
SCORP-2010-001	2	hardwood fragment	In conservation
SCORP-2010-002	2	hardwood fragment	In conservation
SCORP-2010-003	2	US Penny (1976)	Storage solution
SCORP-2010-004	2	bone fragment (vertebra)	Storage solution
SCORP-2010-005	2	Bone fragment	Storage solution
SCORP-2010-006	2	Bone fragment	Storage solution
SCORP-2010-007	2	Bone fragment	Storage solution
SCORP-2010-008	2	Bone fragment	Storage solution
SCORP-2010-009	2	hardwood fragment	In conservation
SCORP-2010-010		Bone fragment	Storage solution
SCORP-2010-011		Bone fragment	Storage solution
SCORP-2010-012	1	Cylinder, metal	Storage solution
SCORP-2010-013	2	wood fragment, charred (2)	In conservation
SCORP-2010-014	3	Weight, lead	Storage solution
SCORP-2010-015	2	Ceramic fragment, redware w/ brown glaze	Storage solution
SCORP-2010-016	2	Glass fragment, red	Storage solution
SCORP-2010-017	2	Brick fragment	Storage solution
SCORP-2010-018	2	Bone fragment	Storage solution
SCORP-2010-019	2	Glass fragment, green	Storage solution
SCORP-2010-020	2	Glass fragment, clear	Storage solution
SCORP-2010-021	2	Glass fragment, clear	Storage solution
SCORP-2010-022	2	Glass fragment, clear	Storage solution
SCORP-2010-023	2	Glass fragment, clear	Storage solution
SCORP-2010-024	2	Glass fragment, clear	Storage solution
SCORP-2010-025	2	Wood, charred	In conservation
SCORP-2010-026	2	Brick fragment	Storage solution
SCORP-2010-027	2	Brick fragment	Storage solution
SCORP-2010-028	2	Ceramic fragment, redware w/ brown glaze	Storage solution
SCORP-2010-029	3	Seed, botanical, red	Storage solution
SCORP-2010-030	3	Wood fragment, cultural	In conservation
SCORP-2010-031	3	Wood fragments, thin (2)	In conservation
SCORP-2010-032		Bone, vertabra	Storage solution
NP	1	Can, metal (Gunther beer)	Storage solution
NP	1	Can, metal, beer	Storage solution
NP	3	Can, metal, (Pabst Blue Ribbon)	Storage solution

APPENDIX C
SCANTLING LIST

Test Unit #2

Timber #	Timber Type	Length	Width	Height	# Fasteners Observed	Notes
T2-S1-P1	Planking	--	24-27cm	2cm	2	
T2-S1-P2	Planking	--	24-27cm	2cm	5 (+ 3 fastener holes)	
T2-S2-P1	Planking	--	24-27cm	2cm	7 (+ 2 fastener holes)	
T2-S3-P1	Planking	--	24-27cm	2cm	4 (+ 1 fastener hole)	
T2-S4-P1	Planking	--	24-27cm	2cm	0	
T2-L1	Longitudinal Support	24cm	6cm	--	12	
T2-B1	Transverse Timber	62.5cm	24cm	6cm	7 (+ 1 fastener hole)	
T2-B2	Transverse Timber	33.5cm	6.25cm	6cm	1	
T2-B3	Transverse Timber	64cm	7.25cm	9cm	8	

Test Unit #3

Timber #	Timber Type	Length	Width	Height	# Fasteners Observed	Notes
T3-S1-P1	Planking	--	15cm	3cm	5	Estimated
T3-S2-P1	Planking	--	15cm	3cm	4	Estimated
T3-S3-P1	Planking	--	15cm	3cm	4	Estimated
T3-S4-P1	Planking	--	15cm	3cm	4	Estimated
T3-S5-P1	Planking	--	15cm	3cm	--	Unclear

Timber #	Timber Type	Length	Width	Height	# Fasteners Observed	Notes
T3-S6-P1	Planking	--	15cm	3cm	--	Unclear
T3-B1	Transverse Timber	62.5cm	8.5cm	6cm	9	Estimated
T3-B2	Transverse Timber	--	17-12.5cm	13cm	12	Estimated