TOOLS OF THE TRADE: A MATERIAL CULTURE STUDY OF HAND TOOLS FROM *QUEEN ANNE'S REVENGE*

By

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Abstract

Blackbeard was one of the most notorious pirates during the 1700s and today maintains a high profile in popular culture. The remains of his flagship *Queen Anne's Revenge* were discovered by researchers off the coast of North Carolina nearly 300 years after the vessel wrecked. The excavation and conservation of this site continues to offer new insights into the work, lives, and shipboard activities of pirates, crew, and slaves aboard *La Concorde*. The hand tools, which include hammers, files, pry bars, jacks, and other instruments for shaping wood represent a growing category of artifacts recovered from the wreck and over a dozen are currently undergoing conservation in Greenville, North Carolina. This thesis examines these artifacts through material culture and object biography lenses and provides insight into vessel maintenance and repair activities that sailors and craftspeople performed aboard vessels in the eighteenth-century. Specific crafts and trades represented by these tools include carpentry, painting, and possible weapon repair.

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Chapter 1: Introduction

History

In the mid-1600s and early 1700s, piracy flourished in the Atlantic and Caribbean basins. For nearly a hundred years, pirates preyed on intercontinental shipping, colonial commerce, and even military convoys with reckless abandon. Among the most notorious and oft remembered pirates is the man known commonly as Blackbeard. In 1717, Edward Teach, also known as Edward Thatch, or Blackbeard, first made an appearance in historical documents commanding a six-gun sloop near Providence in the Bahamas (Wilde-Ramsing 2009:8). Teach is said to have begun pirating with Benjamin Horningold around the Bahamas in 1716. He parted ways with Horningold following a crew mutiny, and in November 1717 Teach intercepted a "large French Guiney Man," a slave trading vessel called *La Concorde* (Johnson 1724:70). Teach renamed the vessel *Queen Anne's Revenge* (*QAR*) and used it as a flagship for his growing pirate fleet. His small armada briefly held the city of Charleston hostage by sea and preyed on shipping throughout the Caribbean and along the American coast. By June 1718, Blackbeard grounded *QAR* near Ocracoke Island and received a pardon from North Carolina Governor Charles Eden. Teach, however, soon returned to pirating. Following a dispatch from Alexander Spotswood, the governor of Virginia, Lieutenant Robert Maynard apprehended and killed Blackbeard near Ocracoke Island in November 1718 (Johnson 1724).

Today, much of Blackbeard's fearsome, even devilish, historical character is echoed in popular culture like Peter Pan, Treasure Island, and the recent Pirates of the Caribbean film franchise. While Teach's cultural significance has survived and even magnified, his flagship *QAR* has endured a slow deterioration through the centuries. As underwater archaeology developed and grew into its own academic discipline, pirate vessels were featured in some of the earliest, and most high-profile discoveries of the 1980s and 1990s.

Archaeology

In 1996, a private salvage company, Intersal Inc., located a large magnetic anomaly near modern day Beaufort Inlet. A brief investigation of the site and consultation with historic records led researchers to identify the wreck as the material remains of *QAR*. Custody and management of the site defaulted to the State of North Carolina. The identification and subsequent excavation of shipwreck remains from the notorious pirate Blackbeard helped to catalyze a new era of popular interest in piracy. State-directed excavations of varying intensity were conducted between 1997 and 2015, and the site is currently monitored on a semi-annual basis (Watkins-Kenney 2019a).

The ongoing research and conservation of the shipwreck and artifacts occurs at *QAR* Conservation Laboratory in Greenville, North Carolina. This work continues to reveal new and compelling insights into life aboard this vessel and the nature of piracy and the slave trade in the early 1700s. Among the cannons, munitions, rigging elements, trade goods, provisions and other artifacts is a growing collection of hand tools. Tools are an integral part of maintaining any wooden sailing vessel and carpenters needed a range of them to maintain the structural integrity of a hull. Other craftspeople on board made use of different kinds of tools to maintain and repair casks, weapons, rigging elements, and even craft personal belongings.

Research Questions and Justification

Tool items are often assumed to be part of the outfitting of any vessel. In formalized Naval contexts, there may be manifests of the minimum tools required for a voyage. Records of the day-to-day lives of pirates, however, remain sparse, and only occasionally does a recorded inventory of a captured pirate vessel survive. The ways in which pirates came into possession of their tools is often as varied and exciting as how they captured the vessels they preyed upon. When *QAR* wrecked, Blackbeard and the crew would have had time to salvage valuables from the ship. So, the tool artifacts left behind may represent items which were not valuable or scarce enough to require salvage.

This study seeks to identify the hand tools recovered and conserved from site 31CR314, *Queen Anne's Revenge*. Tools are often recovered in shipwreck contexts but are frequently overlooked for their interpretive value. An understanding of the purpose and function of each tool will provide information about what kinds of repair, maintenance, and craft activities sailors were expected to perform at sea. Furthermore, this study may reveal information about the work environment that sailors experienced aboard *QAR* and *La Concorde*. It may reveal how space was divided aboard, suggest storage areas, or provide evidence to support or question the current wrecking narrative. This study will add to the body of knowledge about shipboard crafts and the associated material culture.

This analysis aims to answer the following research questions:

- Do the tools from *Queen Anne's Revenge* represent a discreet toolkit of a carpenter, cooper, or other tradesperson?
- What kinds of work could have been performed with these tools and what does that indicate about the activities and work that sailors performed?
- Does the spatial distribution of tools reflect how space may have been used aboard the vessel?
- To what degree are tools in this collection consistent with other contemporary shipwreck assemblages?

- To what extent do the artifacts show evidence of singularization? What kinds of social meanings could these tools have carried based on this evidence?

Further, this research will contribute to the growing body of literature that seeks to understand the archaeological remains from this site. A high-profile wreck of this kind has attracted a lot of international attention, even when the identity of the vessel was a matter of dispute. Multiple studies have been published investigating the primary sources available surrounding *La Concorde* (Ducoin 2001, Moore and Daniel 2001) and Blackbeard himself (Brooks 2015). Preliminary investigations of some artifact classes have been completed for selected categories of objects including ballast stones and precious metals (Craig et. all. 2001), medical equipment (Carnes-McNaughton 2016), ceramics (Schleicher 2007), lead artifacts (Schnitzer 2012, Borrelli 2020), casks (Smith 2009), and beads (Urban 2018). These artifact studies are only a handful among a growing body of research into *QAR*, the history of the vessel, and the site formation processes that have influenced what remains on site.

Methodology

Historical documents, archaeological data, and ethnographic information will be used to investigate the material culture recovered from this site. By creating object biographies for selected artifacts this analysis aims to investigate the "life" of the object. These narratives can help create deeper understandings of how these items were used, the meanings they many have carried, and how they ultimately became part of the archaeological record. Enlightenment era treatises like Joseph Moxon's *Mechanick Exercises* (1703) and Denis Diderot's *Reasoned Dictionary of Sciences, Arts and Crafts* (1751) provide descriptions of a wide variety of handy crafts. They also furnish detailed illustrations of tools, implements, and equipment used in a range of trades from architecture to siege craft, and agriculture to weapon smithing.

The history of Blackbeard has been explored by many researchers before, so efforts will be made to cite primary sources whenever possible. Because the wreck site is managed by the State of North Carolina, the excavation and conservation data of the entire *QAR* project can be requested from the State. As such, the staff at *QAR* Conservation Lab provided all necessary conservation data and artifact images for this analysis.

Data from other shipwrecks and contemporary submerged archaeological sites will provide comparative evidence when identifying tool finds and their function. Shipwreck excavation projects like *La Belle* (1686) and submerged areas of Port Royal, Jamaica (1692) produced strong, comparative material for this analysis. Other wrecks like those in Red Bay Canada (16th century), *Vasa* (1627), and *Mary Rose* (1545) offer somewhat more distant temporal and geographic comparisons. While strong comparative data may be available from the excavation of pirate vessel *Whydah* (1717), like many wrecks investigated by treasure salvage companies, the data suffers from unpredictable archaeological controls and a lack of publication and thus will remain outside the scope of this analysis. Finally, where historical and archaeological data leaves gaps in understanding, this analysis will lean on ethnographic data and experiences of people who have practiced similar handy crafts in modern contexts.

Limitations

The scope of this study is limited based largely on the status of the excavation of the *QAR* site and conservation of artifacts. Few recoveries of artifacts have occurred since 2015 and approximately 50% of the known site remains on the seafloor. Artifacts on the seafloor are susceptible to looting, storms, erosion, and other avenues of potential loss, but this is not a situation unique to *QAR*. As with any archeological site, what is preserved in a modern context is only ever a fraction of the original information, and there is very little that anyone can do to safeguard a site from the forces of nature. It has been proven time and again that in situ preservation is often the most successful long-term method if conservation care is not readily available. As it stands, the *QAR* Conservation Lab has plenty of work ahead. The long duration of many conservation treatments, and the complexity of some artifacts mean that only a fraction of concretions can be worked on at any one time, and storage space within the lab is already taxed.

Most of the recovered concretions were x-rayed to determine what types of artifacts and materials may be present within. This means that some potential tools have been identified in concretion but not yet fully revealed. For obvious methodological reasons, tools still in concretion will not be analyzed in equal depth for this study. Additionally, it is entirely possible that there are more tools in concretions that have not yet been identified. As such, this analysis is only a preliminary evaluation of the hand tools that have been removed from concretion, which are no doubt only a partial representation of the whole compliment of tools originally aboard *Queen Anne's Revenge.*

Chapter Overview

The first chapter covers the purpose and goals of the thesis and introduces the theoretical and methodological approaches of this research. The second chapter provides a comprehensive history of Blackbeard, his capture of *La Concorde*, the history of shipboard crafts and trades, and ultimately the demise of Blackbeard and his flagship. Chapter three summarizes the discovery of *QAR*, discusses on site archaeological activities and conservation methods, and provides information on comparative archaeological materials from other sites. Chapter four discusses the theoretical approach and methodology used to conduct this research. The fifth chapter provides descriptions and interpretation of each tool included in the study and draws parallels to illustrated representations of hand tools in historical sources and other archaeological sites. The final chapter builds out object biographies for selected artifacts, answers the research questions, and summarizes the findings.

Chapter 2: Historical Background

The complete story of *Queen Anne's Revenge* and its associated artifacts begins before Blackbeard captured the vessel in the Caribbean and continues well after it was grounded on the Outer Banks of North Carolina. As such, to interpret hand tool artifacts recovered from the wreck, it is necessary to trace the known history of the vessel from first mentions in French sources, through its service as a merchant and pirate vessel to its present disposition as an archaeological site and ongoing conservation project. A discussion of the history of craftspeople aboard 18th-century sailing vessels will also provide context for evaluating the significance of hand tool artifacts recovered from *QAR*.

Before serving as Blackbeard's flagship, the vessel was known as *La Concorde* and operated as a privateer and slave trading vessel out of Nantes, France (Moore and Daniels 2001). No details of the ship's construction have yet been uncovered, but archival records have provided invaluable evidence for tracing the service life of *La Concorde*. The vessel was owned and operated by Renè Montaudouin, a merchant from Nantes. Archival records indicate that while under Montaudouin's ownership, *La Concorde* served as a privateer from 1710 to 1711 during the War of Spanish Succession. The vessel then completed two slaving voyages around the Atlantic, one beginning in 1713 and the other in 1715 (Ducoin 2001:11-12). *La Concorde* departed on a fateful voyage in March 1717 which would end in November of the same year when the vessel was intercepted by Blackbeard near the Caribbean island of Martinique (Mesnier 1717; Ducoin 2001:7). Blackbeard's seizure of *La Concorde* is first recorded in letters between the François de Pas de Fequières, Governor of Martinique, and the island's intendant Charles Mesnier during December 1717 (Ducoin 2001:20-21; 30; 61). The captain of *La Concorde*, Pierre Dosset, and First Lieutenant François Ernaut eventually made their way back to France and recorded depositions to the Admiralty regarding the incident. While the men disagree slightly about details like armament and crew size aboard *La Concorde*, both report that the vessel was seized by an Englishman by the name of "Edouard Titche" (Mesnier 1717; Dosset 1718; Ernaut 1718; Ducoin 2001).

Edward Teach, alias Blackbeard, first appears in the historical record in December 1716, but by October 1718 he met his demise. In this brief window, Blackbeard and his colleagues terrorized shipping and trade in the Caribbean and along the colonial coasts of the Western Atlantic. In December 1716, Captain Henry Timberlake reported to administrators in Jamaica that pirate crews led by "Hornigole" and "Thach" plundered his 40-ton brigantine *Lamb* 25 miles west of Hispaniola (Moore 2018:56). Teach and Benjamin Horningold raided around the Caribbean and Atlantic basin before parting ways sometime in 1717. Teach was reported commanding a twelve-gun sloop and attacking commerce along the coasts of Delaware and Pennsylvania in late October and early November of 1717 (Boston News-Letter 1717; Moore 2018:161). As winter descended in New England, Teach returned to more temperate hunting grounds in the Caribbean to continue his depredations. On 28 November 1717, Blackbeard intercepted *La Concorde* sixty leagues from Martinique. Blackbeard's gang consisted of two sloops: one mounted with 12 guns reportedly carrying 120 pirates, and the other with eight guns and 30 crew (Ducoin 2001:5). *La Concorde* was a much larger 200-ton vessel, armed with 14-16 cannons and 73-75 crew members. During transit, dysentery claimed the lives of approximately 18 sailors, leaving only 21 men well enough to stand watch and sail the ship and allowing pirates to easily overpower their crippled French crew and seize the vessel (Dosset 1718; Ernaut 1718). Ten French crewmembers were forced into Blackbeard's service including master carpenter Espirit Perrin, second carpenter Renè Duval, caulker Jean Poloin, and gunsmith Jean Jacques

(Ernaut 1718; Ducoin 2001:27-28). Seven French crew members joined the pirates voluntarily while the remaining crew was given a small sloop with which to transport themselves and the 374 remaining slaves to safety (Mesnier 1717; Ernaut 1718; Ducoin 2001:25).

Blackbeard quickly renamed the vessel *Queen Anne's Revenge* and continued his piratical activities around the Caribbean, taking several prizes near Cuba and the Bay of Honduras. In early December 1717, the gang captured a sloop, *Margaret*, near Puerto Rico seizing 35 hogs, gunpowder, arms, instruments, gold dust, and pressing into service a cooper named Edward Salter (Bostock 1717). The growing pirate fleet was increasingly concerned with the logistics of providing food and water for the crew. Because the French cooper assigned to *La Concorde,* Jean Coupard, died before encountering the pirates, Blackbeard and his crew needed a cooper's skills to repair and maintain the casks that stored essential supplies while underway (Dosset 1718; Ernaut 1718). As the seasons changed again, Blackbeard migrated north to the Carolinas where in May 1718 he infamously held Charlestown hostage by sea. *QAR* and two smaller sloops "rode at anchor with their black flags flying four days" plundering incoming and outbound shipping and demanding a chest of medicine from the Governor (Fox 2014:385-386). Upon receiving the medicine, Blackbeard released many of the plundered vessels being held hostage. He added two sloops to his pirate fleet and continued north to the coast of North Carolina (Figure 1).

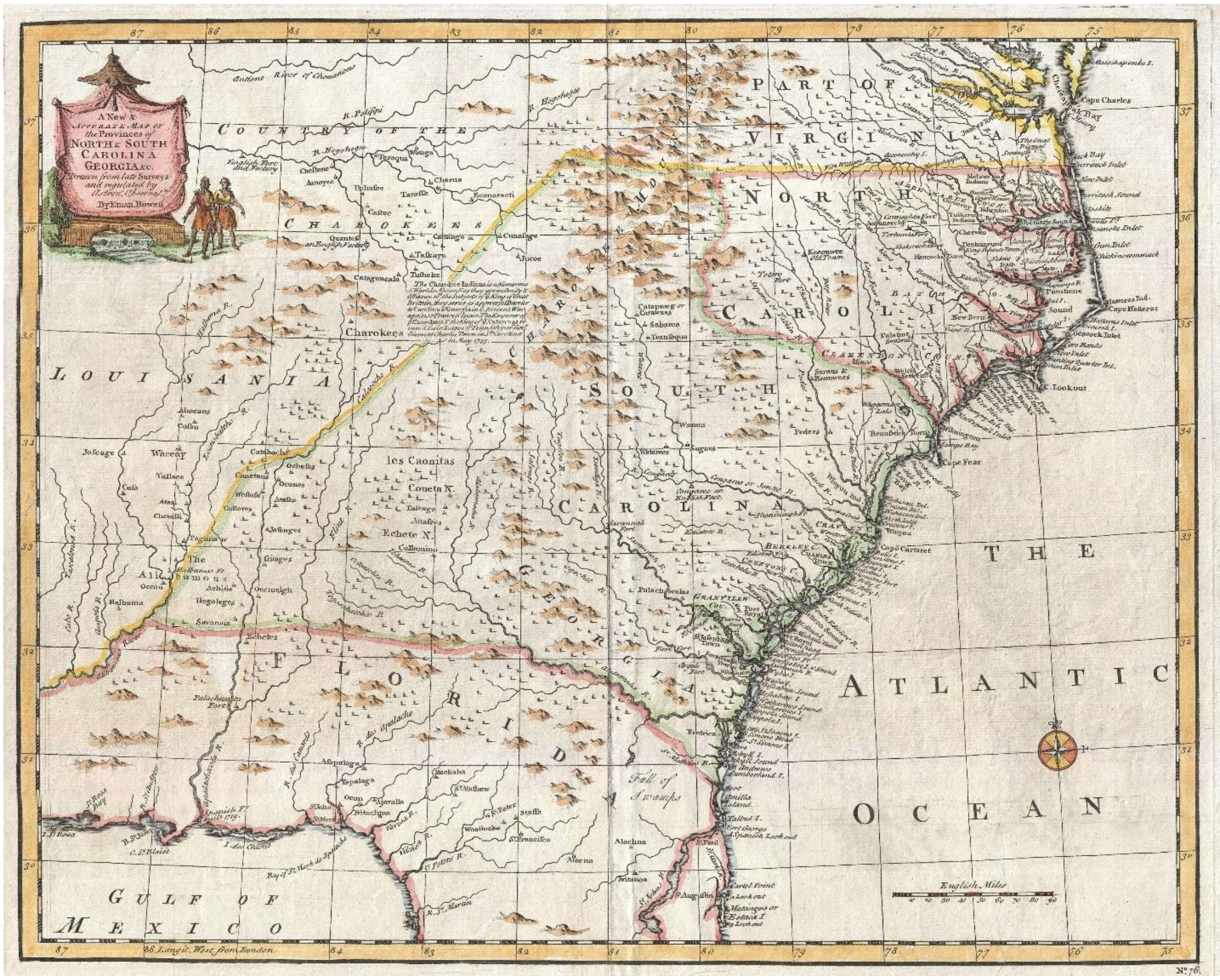

FIGURE 1. Bowen Map of Southeastern United States 1747. Image courtesy of Wikimedia Commons.

QAR and four other sloops arrived at Topsail Inlet (modern-day Beaufort Inlet), approximately a week after departing from Charlestown (Spotswood 1718:273; South Carolina Court of Vice-Admiralty 1719). Teach's exact intentions are unclear, but he seemed to be sailing for one of his known haunts on Ocracoke Island. Perhaps he sought to refit his fleet after the extended sea voyage or to hide from the inevitable repercussions of blockading Charleston harbor. Testimonies survive from David Herriot and Ignatius Pell, who sailed with Blackbeard and were later captured and tried as members of Stede Bonnet's pirate crew. Their testimonies are likely as close as historians will ever get to an eyewitness source for the wrecking events of *QAR*. Both men characterize the loss as a 'grounding,' rather than a wrecking, scuttling, or another more violent or intentional event (South Carolina Court of Vice-Admiralty 1718). Recent research into lead artifacts reveals that lead patches were used extensively in the stern to help seal leaking seams and suggests the hull needed serious repairs (Borrelli 2020:369).

A notorious pirate grounding his flagship on a sand bar may seem anticlimactic, but its fate should come as no surprise for those familiar with the shallow, treacherous, and ever-shifting sandbars of the Outer Banks. *QAR* was a massive vessel for the underdeveloped coastline of North Carolina, where safe channels were neither marked, charted, nor dredged. Teach added up to 20 extra guns (Johnson 1724) to the vessel's armament following the ship's capture, meaning that it likely drew deeper than usual. These factors made navigating Topsail Inlet on sail alone akin to threading a needle. Herriot and Pell later claimed in their court testimonies that Blackbeard had grounded the vessel on purpose to avoid paying out shares to the crew. Given the courtroom context of these statements, however, it is likely that this was an attempt to deflect culpability for piratical activities (South Carolina Court of Vice-Admiralty 1718).

Regardless of his intentions, Teach took the opportunity to downsize his fleet and seek a pardon from Governor Charles Eden of North Carolina. Much of Blackbeard's crew was marooned on the Outer Banks, disbanded, or reassigned to other vessels within the fleet. Teach fled to Bath, the colonial capital of North Carolina, to receive a general pardon for his previous crimes of piracy. With the help of Governor Eden and Tobias Knight, a port collector in Bath, Teach continued preying on coastal shipping "with less suspicion" by explaining that his prizes were "found at sea without either men or papers" (Spotswood 1718:305; Hughson 1894:75). After increasing pleas from colonies and victims along the eastern seaboard, the capable Governor Alexander Spotswood of Virginia acted. Spotswood issued a reward of £100 for the apprehension of Blackbeard, £40 for commanders, £20 for lieutenant masters, quartermasters, and carpenters, £15 for other officers, and £10 for members of the crew (Johnson 1724:80-81; Hughson 1894:76).

Lieutenant Robert Maynard from Virginia led a small sortie of two sloops to arrest Teach in North Carolina. With the expertise of Carolina pilots, Lt. Maynard was able to locate and trap Blackbeard's small, eight-gun sloop inside Ocracoke Inlet on 22 November 1718. After a brief and violent battle, ten English sailors died and 24 were wounded, while nine pirates, including Blackbeard, were killed. Remaining pirates were placed in custody (Spotswood 1718:305). A letter from Tobias Knight was allegedly found on Blackbeard's body which warned him of the coming sortie from Virginia, indicating Knight's and Governor Eden's friendship with Blackbeard (Hughson 1894:80). Knight was later charged with accessory to piracy but acquitted. Unsurprisingly, there is no evidence that any charges were ever filed against Governor Eden (Howell 1816; Hughson 1894:80-83). Lt. Maynard returned triumphant to Virginia, allegedly hanging Blackbeard's head from the vessel's bowsprit while his body and flagship, *QAR*, were left to decompose into relative obscurity.

Shipboard Crafts

Among the glamor and glory of sailing the high seas, pillaging ships, or hunting pirates is an often-overlooked class of sailor: the shipboard craftsperson. Many large sailing vessels made it a habit to carry a selection of skilled craftsmen which could include carpenters, coopers, caulkers, and gunsmiths. These sailors had specialized knowledge and skills and often inhabited unique social positions aboard a ship. Countless treatises, books, and dissertations have been written about building ships on land, but far less has been published about what it takes to maintain a vessel while at sea. One important study of such activities is Brendan McDermott's (2000) Master's thesis which evaluates the roles and lives of English and American Shipboard

Carpenters between 1725 and 1825. McDermott's study focuses largely on merchant and military vessels, but certain general views about shipboard carpenters may be extracted to evaluate the collection from *QAR*. McDermott's study relied on historical documents, archaeological evidence, and ethnographic information to understand a carpenter's status aboard a ship.

A wide range of crafts and skilled work were practiced aboard sailing vessels. These activities include, but are by no means limited to carpentry, cooperage, surgery, rigging, sail making, painting, and weapon repair. The following summary of shipboard craftspeople and their roles focuses on the activities that are most likely to be performed using the tools recovered from *QAR* thus far.

<u>Carpentry</u>

Carpenters were skilled craftsmen tasked with caring for the structural integrity of a vessel and were responsible for maintaining "the hull, masts, and spars of the ship" (Rodger 1986:23). A carpenter was responsible for daily inspections of all parts of the ship, evaluating the caulking, pumps, masts, and spars, reporting any issues, and repairing damage when necessary and possible. Their responsibilities were largely the same across Naval, merchant, or privateer services, duties varying only slightly in the degree of regimented structure (McDermott 2000:42). Despite their unique expertise and commensurate pay, carpenters were infamous for filching and reselling supplies in port to supplement their income. Later regulations in the Royal Navy attempting to curb this 'shrinkage' required carpenters to take careful inventory of their stores and account for any losses (McDermott 2000:28-29). During battle, the carpenter and their crew were kept busy plugging shot holes and damage at or below the waterline to stem the intake of water (Roger 1986:55). Alternatively, carpenters often feature in historical documents when their skill and ingenuity saved the crew following a wreck or stranding event. Carpenters were one of the only people aboard a ship that could confidently repurpose a small boat or create a seaworthy raft to get survivors to safety following a shipwreck (McDermott 2000:88-89).

The social status of shipboard carpenters varied based on service mode. On British naval ships, carpenters were warrant officers of middling status, but their skills often earned them the "respect and favor of all sensible captains" (Rodger 1986:23). These sailors frequently began their careers as apprentices in shipyards and were "warranted to a ship when she was built… and – in theory, at least – stood by her or served in her throughout her life until he or she perished" (Rodger 1986:21-23). This arrangement afforded them a degree of job security and allowed them to build an intimate knowledge of their ship. Aboard American ships, carpenters were viewed as professional artisans and signed aboard for a single cruise at a time. Captains of privateer vessels generally maintained the hierarchical relationship between command officers and warrant officers and were occasionally known to sail without a carpenter depending on the perceived risk of a venture and availability of skilled craftsmen (McDermott 2000:21). In the merchant service, carpenters were particularly sought after for extended voyages away from friendly ports (McDermott 2000:24). These craftspeople often experienced better conditions than ordinary crewmembers but were below the status of mates, socially stratified equals to boatswains and gunners (McDermott 2000:23; Rediker 1987:83). Carpenters in all services commanded some degree of respect and authority. They enjoyed the privileges of being considered idlers, which included freedom from standing watches, or reporting to calls of 'all hands' (Rodger 1986:26, 40). The carpenter's status was also reflected in their compensation, which was generally on par with the wages of the boatswain, gunner, and other warrant officers. Carpenters aboard privateers often enjoyed between one and a quarter to two shares of any captured prizes (Rodger 1986:46-50).

Carpenters were required to maintain a wide selection of tools and implements to carry out the broad scope of their work (Figure 2). Shipboard carpentry activities included the need to move, shape, and fasten timbers of various sizes, from a mast or structural deck beam down to the gun port hatches and any finely carved wooden decorations. Large structural timbers could be moved and manipulated using the rigging, mechanical jacks, and pry bars. Those timbers would have been shaped using saws, adzes, planes, drawknives, chisels, and gouges. The shaping tools, in turn, needed to be maintained and sharpened using files. Fastening structural elements requires that holes be bored using augers before drifts, bolts, or pins could be driven through.

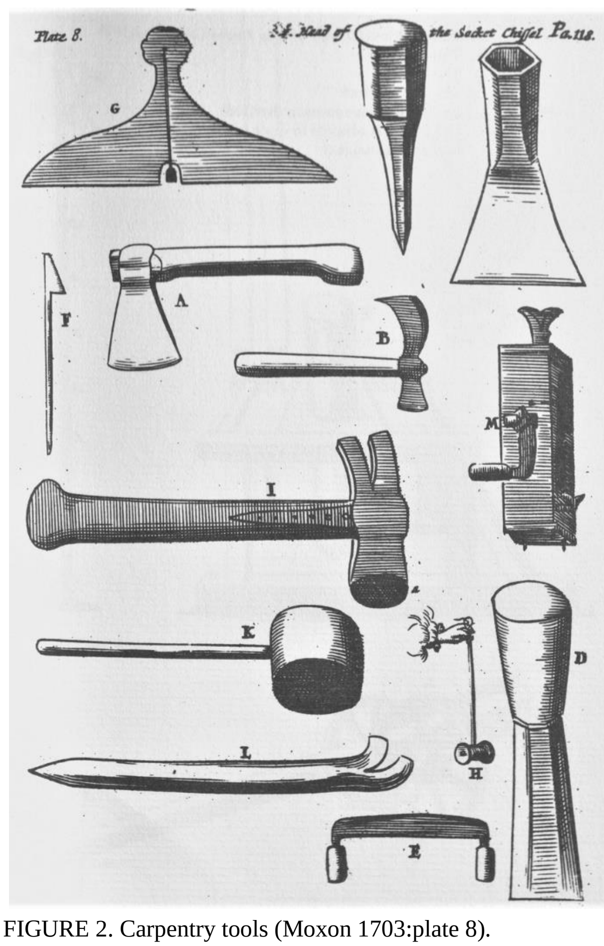

FIGURE 2. Carpentry tools (Moxon 1703:plate 8).

Sledges and mauls were then used to peen over and secure the ends of fasteners. Fastening smaller woodworking tasks like replacing sheathing, repairing containers, or internal repairs is accomplished using tools including gimlets, and a wide variety of hammers (Moxon 1703; Diderot 1768; Roger 1986; McDermott 2000).

These craftspeople not only inhabited a unique social position aboard a ship, but often a distinct physical space onboard as well. In the British Navy, storerooms were usually located in the bow of the ship. A carpenter's sleeping quarters could be at the bow near the storeroom, or among the other warrant officers in the stern area (McDermott 2000:71-72; Rodger 1986:66). On slaving vessels, storage and workspaces were frequently moved sternward, behind wooden barricades to prevent tools and other potential weapons from falling into the hands of enslaved Africans (Rediker 2004). When undertaking a large project carpenters were known to expand their working area into animal pen spaces, or above deck (McDermott 2000:74). While actively working on a project, carpentry tools may have laid about the deck, and occasionally become lost or stolen. Historic records reveal that carpentry tools were also used to cut away fouled rigging, carry out mutiny, murder crewmates, attack enemy forces, butcher animals, and even amputate limbs (Jameson 1923:329; McDermott 2000:78-79). Despite their frequent repurposing, tools not in use would have typically been stored in chests in the carpenter's storeroom or sleeping quarters. This generally centralized storage system is illustrated in the inventory of the 1745 prize *Willem,* which included three chests of carpentry and coopering tools with stores of nails and paint (Jameson 1923:466).

<u>Cooperage</u>

Second to carpenters, a skilled cooper was also a highly desirable member of the crew. While the coopers were not directly responsible for the safety of the ship like the carpenter, they were key to ensuring the safe provisioning of food and drink for the crew. Virtually all food and drink aboard sailing ships of this era were stored in casks of various sizes. The cooper was responsible for building, maintaining, and repairing buckets, casks, and other storage containers to ensure that there was plentiful space for provisions for the duration of a crew's voyage (Cordingly 1996:122). Cooperage is a specialized woodworking activity which requires a careful eye and practiced skill. For a cask to be structurally sound, each stave was carefully shaped ensuring that it was properly concave, appropriately tapered at each end, and maintained a consistent beveled edge along the sides. Coopers frequently also used punches, hammers, rivets, and a cooper's anvil to cold forge the iron hoops used to secure the cylindrical shape of a cask (Kilby 1977).

The quality of a barrel is determined by the cooper's skill level and the specific purpose of the container. For instance, casks used to transport dry goods and preserve food need only have a general form of a cask and be structurally sound. By contrast, casks used to transport water or other liquids needed to be leak-proof, requiring beveled edges to be flusher and more precise. This kind of 'wet cooperage' required a higher skill level than that of 'dry cooperage' (Kilby 1977:42). On any sailing vessel, maintaining a safe drinking water supply was critical, thus skilled wet coopers were highly desirable aboard ships of all kinds (Rodger 1986:91). The cooper often worked closely with the purser of a vessel to ensure that supplies and provisions were not wasted unnecessarily. A leaking cask or one that was accidentally broken could mean lost provisions that could lead to hunger or lost goods that could amount to financial ruin during a voyage (Rodger 1986:91). For instance, cooperage was a highly valued technical skill in Basque whaling ships by 1560, where every drop of leaked oil equated to lost profits once the ship returned to port (Ross 1980). Coopers were paid competitive wages and could earn up to twice as much as an ordinary seaman in some cases (Rodger 1986:126-127).

Because of the demands of their work, coopers tended to enjoy a somewhat elevated status. In the Royal Navy, coopers were considered 'private men' and idlers which allowed them to focus on their specialized work tasks (Rodger 1986:26). Coopers were known to sling their hammocks in the quieter areas of the orlop decks, indicating respect for their skill and privacy, but not enough to warrant a cabin or dedicated quarters like warrant officers (Rodger 1986:67).

Due to the nature of woodworking, cooper’s tools frequently overlap with the toolkit of a carpenter. Both crafts require the use of draw knives, planes, saws, hammers, and files for sharpening tools. However, these tools are much more specialized when applied to cooperage (Figure 3). Curved draw knives are essential to creating the concave interior surface on a stave and see infrequent use in generalized carpentry. Similarly, the processes of repairing leaks or ‘heading’ a cask (fitting the flat ends to enclose and seal the cask) also requires a series of

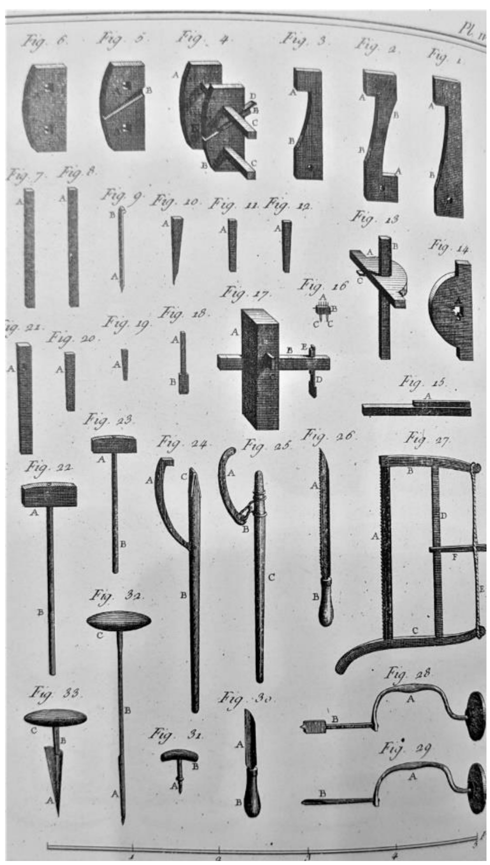

FIGURE 3. Cooper’s tools (Diderot 1978c:2466).

specialized tools like chamfering knives, heading knives, topping planes, croze, and flagging irons. If hoops need to be made or adjusted the cooper will also require beek irons, cross peen hammers (Kilby 1977:29-32).

Other Skilled Crafts

Other craftspeople may have made use of many hand tools like those recovered from *QAR* but have been studied in somewhat less detail than the cooper and carpenter. Armorers could be found aboard large military, slaving, and merchant vessels that expected to encounter heavily armed resistance against pirates or privateers (McDermott 2000). These tradespeople were tasked with sharpening, repairing, and maintaining edged weapons, and often firearms as well. Their work required files for fine sharpening and shaping of metals, small riveting hammers, a vice for holding workpieces, and occasionally a selection of fine carpentry tools.

Caulking and sealing the decks of ships was of utmost importance for the safety of a vessel. For this reason, some idle crew members served in specialized roles as caulkers (McDermott 2000:31). These crewmembers used caulking irons and mallets to fill seams with oakum or other packing fibers then sealed them with pitch that was ladled or otherwise poured into the seams. The inevitable mess of excess pitch was then cleaned up and removed using scrapers (Salaman 1975:446-447). While it was the responsibility of the carpenter to notice issues with caulking, it is unclear to what degree caulkers were considered carpenter’s mates or part of the carpentry crew. In addition, painters aboard sailing vessels occupied a similarly nebulous space within the maintenance plan of a vessel. Oils for mixing paint were often listed under the boatswain’s stores, while some historic documents indicate that painting fell under the purview of the carpenter (McDermott 2000:33). Painters used scrapers, holy stones, and other abrasives to remove previous surface treatments, before reapplying a protective coating of paint with a brush likely constructed with plant or rope fibers (Rodger 1986). A final, critical figure in the maintenance of a ship is the boatswain. While their tasks focus largely on the rigging and sails of a vessel, these crewmembers often made use of a variety of sledges, mauls, pry bars, jacks, and other striking tools (Rodger 1986).

Acquiring Craftspeople

Recruiting craftsmen with specialized skills was at times challenging for the Royal Navy and was trickier still for merchant fleets and privateers. Meanwhile, pirate vessels faced all the same maintenance requirements, but almost none of the infrastructure to recruit or hire craftspeople while in port. Instead, pirate crews forced craftspeople from captured vessels into service aboard pirate vessels (Cordingly 1996:122). When Blackbeard captured the much larger *La Concorde*, he needed a proportionally larger corps of skilled labor to support the smooth operation of his new vessel. Skilled crew conscripted from *La Concorde* included a pilot, three surgeons, two cooks, a gunsmith, boatswain, two carpenters, and a caulker. Captain Ernaut's (1718) testimony names "Espirit Perrin master carpenter… [and] Renè Duval, second carpenter from Nantes" among the men pressed into piracy. A contemporary quarter bill for a privateer of comparable size called for four carpenters in the crew (Wilde-Ramsing 2009:12). The two French carpenters were possibly supplementing Teach's previous carpentry crew, or simply the influx of unskilled slave labor from *La Concorde* provided the master carpenter with enough labor to appropriately maintain the growing fleet of ships. Two French coopers aboard *La Concorde*, Jean Coupard and Pierre Lemoyne, died from disease before the ship was captured. A third cooper Pierre Pere returned to Nantes, apparently lacking the professional skill to ensure storage and provisions for the large crew aboard *QAR* (Ernaut 1718). When Blackbeard took the sloop *Margaret* in 1717, one of the men he conscripted was a cooper named Edward Salter (Bostock 1718).

By the late eighteenth century, it became customary to supply most shipboard tool kits on merchant and naval vessels (McDermott 2000:79-80), and in larger naval vessels "cooper’s tools had to be supplied" (Rodger 1986:91). It is, therefore, reasonable to suppose that the tool kit aboard *La Concorde* was French in origin and was maintained throughout the transition to *QAR* and until the vessel was ultimately lost.

Conclusion

Tracing the history of *La Concorde* cum *QAR* provides some insight into the origins of recovered artifacts, including the hand tools. In undertaking an analysis of shipboard tools, it is important to remember that artifacts recovered from *QAR* may have come aboard the vessel in a variety of ways. The tool artifacts may have been part of the original outlay of the French vessel, purchased during the vessel’s trade service, brought by pirates from other raided vessels or in personal tool kits of individual craftsmen, or any combination of these methods. Due to the functional imperative of hand tools, however, their forms vary rather little through time and space. As such it is nearly impossible to interpret origins for most tools based solely on morphology. Later sections will evaluate the kinds of activities the represented tools allowed crewmembers to preform, and by extension, form hypotheses about the types of toolkits represented, and the craftspeople who used them.

Chapter 3: Archaeological Background

Blackbeard has long been a popular historical and cultural figure in coastal North Carolina. Early efforts to locate archaeological traces of Blackbeard and his activities began with a 1979 partnership between state archaeologists and divers from East Carolina University (ECU) aiming to locate shipwrecks, wharves, and other submerged features in Bath harbor (Broadwater et. all 1979). Magnetometer survey along Bath creek revealed a wharf structure that researchers proposed could have been used by Blackbeard during his supposed stay in the area (Wilde-Ramsing and Carnes-McNaughton 2018:4). During this project, no evidence was identified to positively link the wharf with Blackbeard, but legends of pirate gold rarely deter treasure salvers from seeking the remains of pirate vessels around the world.

Following several high-profile shipwreck discoveries and salvage operations of Spanish treasure galleons in Florida during the 1970s, other treasure hunters and private salvage companies were inspired to search for treasures of their own. Intersal Inc. was among the salvage companies to try their hand at shipwreck hunting in Florida and along the Carolina coast. In 1987 the State of North Carolina issued Intersal survey permit BUI 549 to search for the remains of Spanish-owned vessel *El Salvador* lost near Beaufort in 1750 (Morris 2018:223). Common lore among inhabitants of the Outer Banks maintains that Blackbeard favored the area and lost his flagship *Queen Anne's Revenge* among the shifting coastal sandbars. Rumors of pirate gold and other valuables aboard Blackbeard's flagship may have motivated Intersal to secure a second permit, BUI 565, from the state in 1989 which allowed their survey teams to search for the remains of *QAR* (Morris 2018:221). In November 1996, a magnetometer survey of the sandbars near Beaufort Inlet revealed a large concentration of iron artifacts. A selection of artifacts was recovered by Intersal divers and stored in freshwater tanks in hopes of identifying the vessel. The

North Carolina Underwater Archaeology Branch (UAB) of the Offocie of State Archaeology was contacted immediately about the finding. Divers from UAB soon surveyed the site which consisted of least ten cannon, two large anchors, exposed hull remains, and a large pile of ballast stone (Wilde-Ramsing and Carnes-McNaughton 2018:6-8). Previously recovered artifacts were handed over to UAB. Archaeological conservator Leslie Bright removed layers of concretion to reveal a brass blunderbuss and a bronze bell with a casting date of 1705 (Wilde-Ramsing and Ewen 2012:113). These artifacts indicated that Intersal located a heavily armed vessel dating to 1705 or later in a location that historical documents indicate could be the final resting place of *QAR*. Because the wreckage lay within state waters, custody and care of the site fell to the state of North Carolina.

In March 1997, Governor James Hunt announced the discovery. That spring and summer, UAB began directing site assessments, surveys, sampling, excavation, and recoveries (Wilde-Ramsing and Ewen 2012:110). In the first field season, archaeologists sought to survey the exposed site, determine the extent of the wreckage, collect samples, and conduct a test excavation. A 3 x 6 foot test unit was excavated by dredge on the southern end of the site, yielding 284 artifacts including a cannon, lead shot, ballast stones, ceramics, pewter plates, glass, wood, and bone fragments. The following year, archaeologists excavated three trenches to help determine the extent of the site (Figure 4). Trenches transected the site and were positioned at the estimated northern, middle, and southern extent of the site. Sediment was removed using a dredge to expose and map in artifacts. "Recognizable artifacts," usually glass, ceramic, and metal, were recovered for conservation (Wilde-Ramsing and Carnes-McNaughton 2018: 62-63). In 1999 gradiometer survey was conducted to further delineate the extent of the debris field. The resulting data indicated the presence of more iron artifacts buried beneath the sediment. The mounting body of evidence suggested that the wreckage was of significant historical value and plans needed to be in place to safeguard the site.

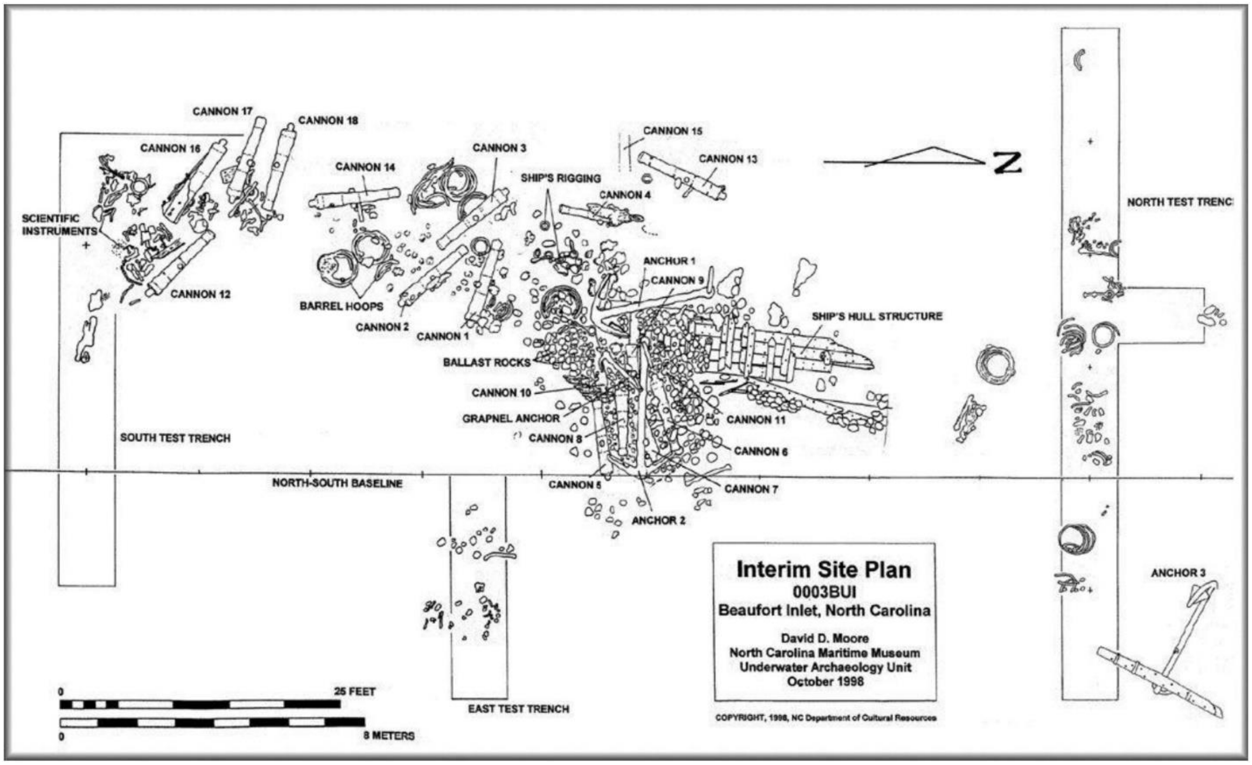

FIGURE 4. Site plan October 1998 showing trench excavations. Image Courtesy of NCDNCR.

The first management plan for *QAR* published in 1999 recommended large-scale excavation and recovery (Wilde-Ramsing and Lusardi 1999) This option provided the best opportunity to recover significant historical information, and to promote public education and tourism. The management plan specifies that the North Carolina Department of Cultural Resources, Intersal Inc., and the non-profit Maritime Research Institute would work in partnership to preserve and protect the site. Further, the artifacts recovered from the site would "be kept as an intact collection in an appropriate repository" (Wilde-Ramsing and Lusardi 1999). Archaeologists determined the site regularly underwent periods of scour and reburial as the sand, currents, and channels shifted in and around Beaufort Inlet through the centuries. This cycle is exacerbated by hurricanes that plague the coast and threaten to scatter artifacts from the site.

Four hurricanes between 1998 and 1999 exposed a large portion of the ship's hull. Fearing those wooden structures were all that remained of the vessel's hull, an emergency expedition was undertaken in May 2000 to recover the exposed planking and excavate underneath (Wilde-Ramsing and Carnes-McNaughton 2018:65). Between 1996 and 2005, 15 hurricanes impacted the wreck site. Regular site monitoring revealed areas of scouring on-site following many storms. Scoured areas often contained only brass and lead artifacts, whereas, based on previous test excavations, those same areas could reasonably be expected to have contained lighter artifacts like ceramic, glass, wood, and bone (Wilde-Ramsing and Carnes-McNaughton 2018:66). State funding was channeled into emergency recoveries, site monitoring, and post-hurricane site management. Unfortunately, these expensive activities slowed recovery work and state funding appropriations dried up as the initial excitement of discovery waned.

Up to that point, the work of conserving recovered artifacts had taken place in several temporary locations, but with plans to continue excavation and recoveries a more permanent solution was in order. The initial UAB conservation facility at Kure Beach proved too small and distant for project staff to appropriately monitor the collection and respond to emergencies like leaking tanks. In 1999 a field conservation office was set up in a Morehead City warehouse owned by UNC, for a two-year, unrenewable occupancy. When UNC moved to reclaim that warehouse for new construction, UAB sought new partners for a more permanent solution. In 2002 the State of North Carolina and ECU reached an agreement to construct a permanent conservation laboratory in a cold-war era radio surveillance site known as "Voices of America." What started as a small lab, soon grew into over 8,000 square feet of laboratory and warehouse space (Wilde-Ramsing and Carnes-McNaughton 2018: 76-77). By 2004, the lab was officially open and ready to act as a repository, conservation lab, and research center for continued artifact recoveries.

In spring 2005 the new conservation lab hosted a symposium to review the state of the project and suggest future directions. Specialists shared results of artifact analysis, sample testing, and archival research. When evaluated in totality, the research supported the working hypothesis that the wreck site was *Queen Anne's Revenge*. Specialists, curators, and archaeologists discussed the future of the project and strongly recommended that the project continue large-scale excavation, recovery, and conservation of artifacts (Wilde-Ramsing and Ewen 2012:112). A fourth trench was excavated in 2004 which further confirmed the general orientation and extent of the wreckage. In the spring of 2005, a stratified sampling technique was used to excavate 23 units in seven distinct zones of the site (Figure 5). This sampling aimed to determine possible differences in artifact distributions between the port and starboard sides, and

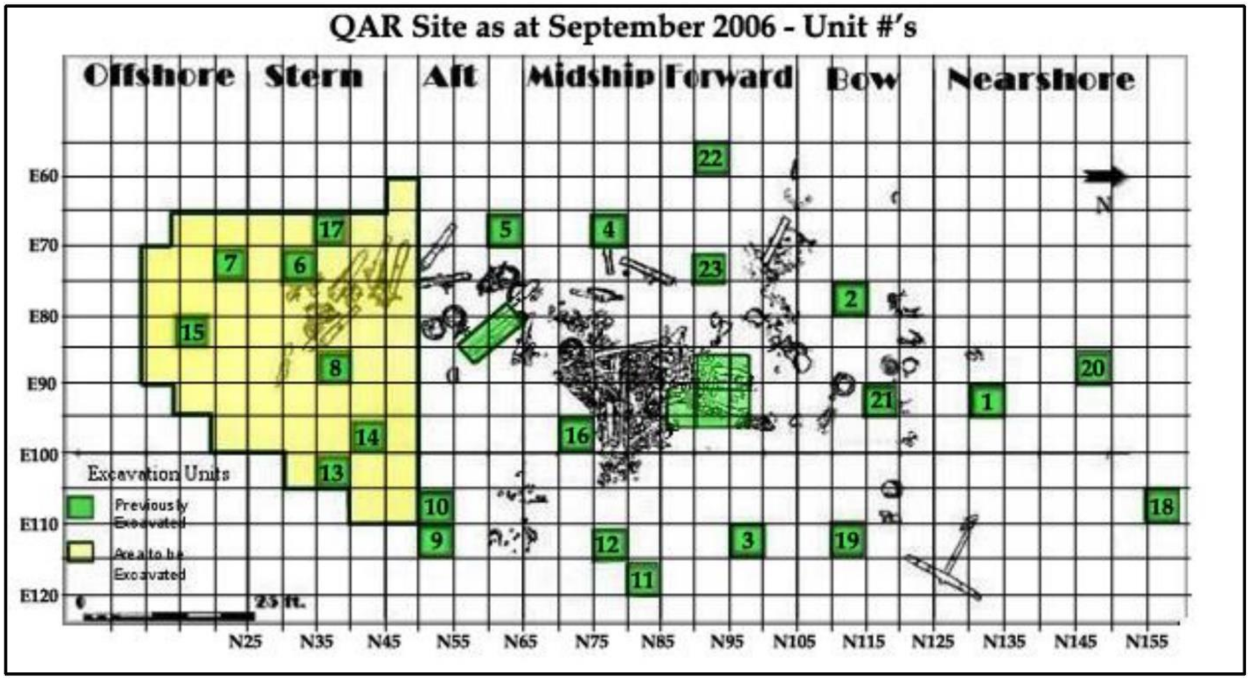

FIGURE 5. Excavation plan for September 2006 fieldwork showing units included in the 2005 stratified sampling colored green. Image courtesy of NCDNCR.

between fore and aft sections of the vessel. Artifacts were recovered from all 23 test units and revealed that the vessel had careened to the port side after running aground and decomposed in place (Wilde-Ramsing and Carnes-McNaughton 2018:37; 67).

With a fully functional conservation lab and new funding in place, archaeologists were finally able to pursue full recovery of all cultural materials found on-site (Morris 2018:226). In 2006 alone, almost 1,500 new artifact numbers were assigned, and following x-ray imaging, the number of recognizable artifacts climbed to 237,716 (Wilde-Ramsing and Carnes-McNaughton 2018:77). Approximately 90% of artifacts in the current collection were recovered from the site between 2006 and 2007 (Watkins-Kenney 2019a:3) Archaeologists began in the stern and worked forward methodically to excavate and record each 5x5 foot unit. Artifacts were then recovered and sent to the lab for conservation. A significantly diagnostic fragment of the sternpost was recovered in 2007, which provided strong evidence that the vessel was of French construction, further supporting its identity as *QAR*. Following the 2008 recession funding became sparse, but site monitoring, excavation, recovery, and conservation work continued, budget permitting. As the backlog of materials awaiting conservation grew, the project shifted excavation focus to the large mound of concretion amidships. Archaeologists meticulously mapped artifacts on the mound in both horizontal and vertical planes, before using pneumatic hammers to separate artifacts from the larger concreted matrix. Using this method, nine guns and several large concretions were recovered in 2013 with the help of the US Coast Guard and a research vessel from Cape Fear Community College (Morris 2018:226). Between 1996 and 2015 (Figure 6) a total of 5,301 dives were conducted on-site, equaling 4,384 hours of underwater archaeological investigation (Morris 2018:222). Two hundred eighty-five excavation units totaling 1,725 square feet of seabed were excavated over the course of ten years (Wilde-Ramsing and Carnes-McNaughton 2018:73). Since the conclusion of the most recent field season in 2015 researchers involved with the project have focused on conserving and researching the massive collection. Divers from UAB continue to monitor the site for potential changes and signs of looting.

Year	Months (no. weeks)	No. Weeks	Fieldwork Undertaken	Large Artifacts Recovered
1996	November	0.2	Post discovery site inspection	
1997	September-October	4	Survey, Investigation, Test Units	Cannon (C2, C3)
1998	September-October	5	Survey, Investigation, Assessment	Cannon (C4)
1999	June; October	2	June: Magnetic gradiometer survey; October : post Hurricane Floyd site check	Cannon (C19, C21), hull plank
2000	May-June (2); September-October (3)	5	Emergency Recovery of exposed hull structure	Exposed hull Structure
2001	May (1); October (0.6)	1.6	May - Survey, Site Check ; October - Dive Live event; Conservation Live event	Cannon (C22)
2002		0	None	
2003	September-October	1	September - attempt photo-mosaic; October- Post Hurricane Isobel site check	
2004	April (1); October (1)	2	April - photo-mosaic success; October - excavation and recovery operations	
2005	May (4); September-October (0.6)	4.6	May - recovery operations; - stratified sample units; October - Post Hurricane Ophelia site check	Cannon (C15, C24)
2006	May (3); October-November (6)	9	May - stratified sample units; October-November - Full recovery operations; sand berm deposited	Cannon (C5, C25)
2007	June (1); August-November (12)	13	Full recovery operations	Cannon (C16); Stempost
2008	September-October	5	Full recovery operations	Cannon (C18)
2009	October	1	Site check; sand levels check; in-situ monitoring program start	Grapnel anchor
2010	May (1); October (6)	7	May - in-situ monitoring data; sacrificial anodes on A1; October - Full recovery operations; in-situ monitoring- data collection	
2011	May (2); October (4)	6	May - Full recovery operations; October - Post Hurricane Irene site check; Full recovery operations; relocation and reburial six cannon in holding area of site footprint; in-situ monitoring data collection	Anchor A1; Cannon (C13)
2012	September-October	8	Full recovery operations; in-situ monitoring data collection; season end early due to Hurricane Sandy	
2013	June (1); August-November (12)	13	June - recovery of two cannon from holding area; in-situ monitoring data collection; August-November - Full recovery operations; focus on "Pile"; in-situ monitoring data collection, recovery seven cannon	Cannon (C12, C20); Cannon (C1, C6, C8, C14, C17, C26, C27)
2014	October	3	Full recovery operations; focus on "Pile";	Cannon (C29)
2015	September-October	5	Full recovery operations; focus on "Pile";	Cannon (C28)
2016		0	None	
2017		0	None	
2018	October	0.2	Post Hurricane Florence site check	
Total		95.6		

FIGURE 6. Field work operations and large objects recovery schedule. (Watkins-Kenney 2019a:13)

The enormous collection (Figure 7) of artifacts from *QAR* is still undergoing conservation at the lab in Greenville. Over 4,000 concretions have been recovered, and each has undergone x-ray imaging to determine the number and materials of artifacts concealed within. Using this method, over 400,000 individual artifacts have been identified, but that number is expected to grow as conservation progresses (Wilde-Ramsing 2018). The collection includes a wide range of material types including wood, ceramic, glass, bone, rope, textiles, paper, iron, lead, gold, silver,

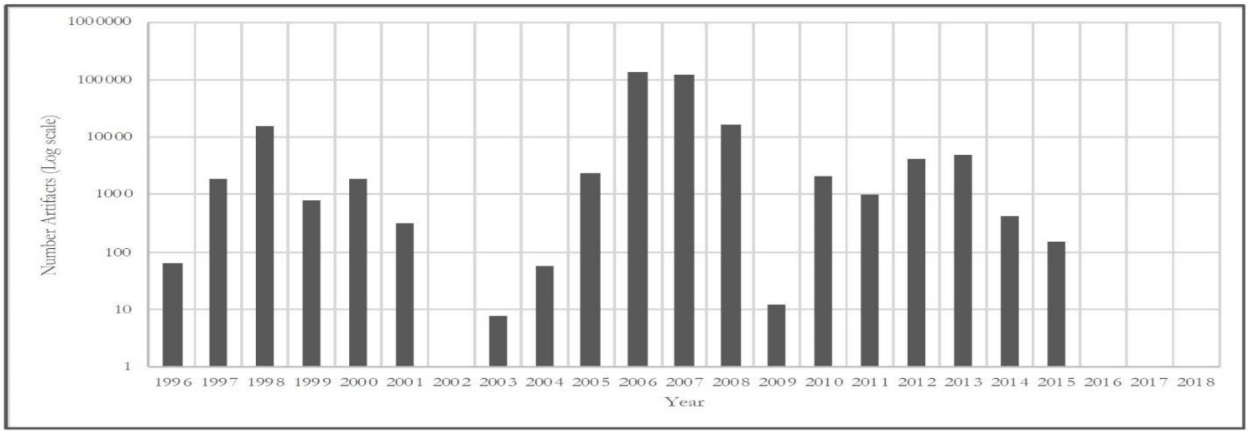

FIGURE 7. Artifacts recovered per year from QAR site, note logarithmic scale (Watkins-Kenney 2019b:3).

and other assorted metals. X-ray photography helps to identify the presence and form of metallic objects or the voids where degraded iron objects once were. Artifacts like cannonballs, flatware, fasteners, and hammerheads are easy to recognize with a trained eye, but organic materials like wood, textile, and rope are less likely to be captured in an x-ray image. Similarly, tightly bundled, or nondescript metallic objects may not be possible to identify through x-ray alone. For instance, a long, thin void with a rectangular cross-section can often be expected to be a standard nail. Once the void is cast using epoxy resin, however, the object may exhibit a pattern of inscribed lines indicating that the artifact is a square file for sharpening tools or other fine metalworking. Pneumatic air scribes are used to remove most intact items from concretion, but other treatments can include baths of hydrochloric acid depending on the material type expected within the concretion.

Once removed from concretion, artifacts must be desalinated with a series of water baths and/or electrolytic reduction. This process removes salts from artifacts that if left untreated would destroy objects and render them effectively useless for interpretation. Following desalination, artifacts are treated and preserved according to the demands of their material type; wood is usually impregnated with polyethylene glycol (PEG), metals with tannic acid and wax, glass is reinforced with a thermoplastic resin (Paraloid B-72), while lead objects are very stable and can go straight from concretion to drying rack. These are a selection of common treatments, but each concretion and artifact require the expertise of a conservator to determine the appropriate course of action.

The artifact assemblage represents a wide range of shipboard activities that fall into categories like medical equipment, provisioning, storage, food and drink, ship handling, and repair. Continued analysis of artifacts within the collection promises to shed new light on the activities and lives of people aboard *QAR* and *La Concorde.* Newly discovered artifacts may provide more evidence to support or question the identity of the vessel, but at the very least the collection provides important information about ships and shipboard life in the early part of the eighteenth century.

Comparative Archaeological Materials

As the following study will focus on the analysis of hand tool artifacts recovered from *QAR*, it is valuable to take stock of comparable finds. The most direct comparison comes from collections of hand tools recovered from other shipwrecks. Because of their context, it can be reasonably assumed that these tools may have been used in similar ways and for similar ends as those found on *QAR.* Other valuable comparisons regarding tool forms and their uses can be drawn from contemporary terrestrial sites.

Tools have been recovered from early shipwreck sites including the Kızılburun wreck, which dates to the late Hellenistic period. This vessel was carrying a load of marble drums and blocks when it sank off the coast of Turkey. Among the artifacts recovered were two chisels, an adze, and a nail remover. One recovered chisel was identified as a stonemason’s chisel because it was constructed from a single bar of iron, indicating its application for heavy, high impact work

(Rash 2012:83-85). The second chisel features a long shank, which is indicative of a tool used for cutting mortices into timbers (Rash 2012:88). A nail remover with forked claws and a curving profile was also recovered from this wreck. This tool was commonly used to apply leverage to remove fasteners and served a similar function as a Roman or modern claw hammer but lacks a socket with which to haft a handle. This tool could also be used as a short crowbar to maneuver the marble cargo aboard the ship and similar crowbars have been recovered from the Roman Porto Novo shipwreck (Rash 2012:82). Finally, an axe/adze was recovered from the Kızılburun wreck. This artifact features two cutting blades, one oriented parallel to the handle, the other perpendicular (Rash 2012:94-95). This artifact combines two of the oldest and most common carpentry tools. It was used to cut and shape wood pieces of middling size and may represent part of a carpentry tool kit used to maintain and repair the vessel.

Moving quickly through time, *La Belle*, a French vessel of exploration and colonization, was discovered with an extensive, and discreet kit of tools. When the vessel wrecked in 1686, the muddy Matagorda Bay covered parts of the wreck and created excellent preservation conditions. Upon the ship's rediscovery in 1995, well-preserved artifacts and cargo included a case known as Packing Box 10. The sealed box was recovered intact and later investigated as a discreet unit. The container was found to hold 'tools for general carpentry and coopering" among other implements and maritime tools (West 2017:636). The chest was stored in the hold of the vessel with other cargo and was nailed shut, indicating that it was likely part of the vessel's cargo and that the security of these objects was important, but not valuable enough to warrant securing with a lock. Measuring about 25 x 11 x 11 inches, the small box featured vertical handles for carrying and lashing down (West 2017:637-638). The recovered tools include one cooper's adze, a cooper's axe, cooper's heading saw, two cooper's drawknives, two carpenter's adzes, a carpenter's draw knife, a carpenter's square, a hewing hatchet, an auger handle and five bits, two gimlet handles, numerous gimlet bits, several varieties of chisels, and a plumb bob. A cooper's plane was also located outside the box, but in the immediate vicinity (West 2017:639). Two of the draw knives were found nestled together and wrapped in textile to protect the cutting edges, while the auger bits were found bundled and wrapped in twine (West 2017:642). This suggests that the tools were not in regular use, and chest was intended as supplies for the French colonial ambitions in the area. A large portion of these tools is specific to coopering and are mixed in with other carpentry, agricultural, and maritime instruments (West 2017).

The sunken pirate haven of Port Royal, Jamaica provides a contemporary and culturally related site for drawing archaeological parallels to tools from *QAR.* A large portion of the city sank into the harbor in 1692 following a violent earthquake. This sudden, catastrophic event preserved many buildings, storefronts, and their contents intact for hundreds of years. A large-scale project undertaken by Texas A&M University researched and excavated portions of the sunken city and recovered a wide range of hand tools. These tools included adzes, auger bits, chisels, caulking irons, sledges, files, and hammers. These tools would have seen use in a wide range of carpentry, construction, and other woodworking crafts (Franklin 1992). Notably, most of the chisels recovered featured socketed handles, a characteristic indicative of usage in woodworking (Franklin 1992:75). Other finds relevant to the study of *QAR* tools include a lathing hatchet fastened with stirrups and an iron fragment that closely resembles portion of a hoe shaped scraper (Franklin 1992:60-61;122).

Later shipwreck sites like *Le Machault*, *Defence*, and *Betsy* provide further comparative materials to evaluate tool kits and their usage aboard sailing vessels. The converted frigate-of-war *Le Machault* sank in 1760 near following the Battle of Restigouche in modern-day New

Brunswick, Canada. Carpentry tools “constitute about half of the tool assemblage” and include axes, pin mauls, planes, measuring bevels, gouges, wooden saw handles, gimlets, augers, drawknives, files, and chisels (Ross 1979:63). The cold waters of the Northern Hemisphere favored the preservation of wooden remains like tool handles, but few of the iron portions of these tools were recovered. Similarly, American vessels *Defence*, scuttled 1779, and *Betsy*, sunk 1781, have yielded evidence of tools in the form of wooden handles for gimlets, awls, augers, mallets, adzes and hammers (McDermott 2000).

Conclusion

The sites chosen for comparison with *QAR* tools is by no means an exhaustive analysis of historic tools found on shipwrecks. Rather they are included in an attempt to understand a broad scope of tools used aboard vessels through time and space, with emphasis placed on collections that are thoroughly documented and researched, well-publicized, and roughly contemporary to the time in which *QAR* was active. These collections help provide comparative materials with which to better understand how tools aboard *QAR* may have been stored, used, and re-used.

Chapter 4: Theory and Methodology

In evolutionary anthropology, tool use is commonly seen as a marker of human ingenuity and evolution. Basic Acheulean hand axes allowed hunter-gatherers to more efficiently harvest and process food, which in turn left a greater reserve of energy that could be used to power brain development. Bigger brains lead to stronger social connections, larger frontal cortexes, and a host of human adaptations and behaviors (Stout 2011). In this way, tools have directly affected the course of human evolution and have always played a reflexive role in the fabric of human society. As cultures and societies grew hand tools seem to have become less studied, and they melt into the background of daily life. While basic tool forms and functions have changed rather little through human history, particularly in the early modern era, they still play an important role in how societies are created, structured, and reformed, both in a literal and figurative sense.

Material Culture

Archaeology is not simply the study of the past, but the study of the "relationship [between] people and things" (Johnson 2010:66). As the discipline developed, the focus began to shift from descriptions of broad cultural patterns or granular investigations of specific sites. Instead researchers sought to "establish the spatial, temporal, and formal correlates of specific forms of human behavior and their material expressions… and to identify similar residues in archaeological contexts" (Trigger 2006:414). This focus of study became known as middle-range theory, seeking to understand how human interactions were mediated by physical objects, and the process by which those objects became part of the archaeological record. The next wave of theorists, post-processualists, sought to push beyond simple correlations and understand what these objects, patterns, and behaviors may have meant to people in the past.

Early antiquarians and ethnographers have always been drawn to collecting material culture objects, and it is a distinctive feature of the practice of archaeology today. However, historically there was little distinction between "scholars… looking archaeologically at material culture in its social context, or anthropologically at society with a theoretical emphasis on the importance of materiality and material things" (Johnson 2010:66). Thus, to really understand material culture, researchers must look at cultural meanings.

Material culture is like a text, in that one object can mean different things to different people. Those meanings can be manipulated in unspoken ways; there can never be one definitive reading of an object, and the meaning of the object is often beyond the control of the original creator (Johnson 2010:109-110). Material culture consists of aspects of the "physical environment that we modify through culturally determined behavior" which includes the body itself, and the kinesthetics of human movement (Deetz 1977:24). Cultural objects can be reflective of social realities because their use is guided and limited by cultural customs and definitions. These same objects can also be manipulated by actors to distort or invert social realities (Trigger 2006:477). So, while tools in the early modern age have changed rather little and have far less of an effect on human evolution, they still have significant meaning to the creation, modification, and reification of social systems.

Historical Archaeology

Historical archaeology has proven to be a fertile testing ground for establishing relationships between cultural meanings and material culture (Trigger 2006:476). Archaeological sites from historic periods often produce rich and varied collections of objects for study and interpretation. Meanwhile, the historic record can greatly inform how those objects were produced, used, traded, and ultimately deposited in a site. These two data sets complement each other to create a fuller picture of the social activities that were conducted in each space (Deetz 1977:8). Discrepancies between artifacts found on a site, and things that are described in historic records can raise questions like: How and why objects were present or absent? What social forces and actions could have influenced their presence on site, and what does it mean?

The complementary nature of historical archaeology can check some of the pitfalls within each field. Historical records will always be biased in some way, subtle or overt, intentional, or not, and no single record can accurately reflect the whole reality of a situation.

> Objects, however, particularly functional objects, are seen as truthful, the real thing, [or] the nearest thing to an objective past… Though an object may be an unbiased, mute witness to every event in its creation, its working life and deposition, there are numerous pieces of information or 'truths' about an object and invariably only some of them are uncovered or explained (Caple 2000:13).

In turn, historical records can inform about some of those truths hidden within objects. Logs, journals, and other sources can illuminate ways in which tools were used, modified, or re-used for non-standard purposes. While Michel Foucault (1972) argued that universal truths do not exist, but are illusions mediated by social power and knowledge; local knowledge provides the best means for decoding the meanings of artifacts. Clifford Geertz (1973) attempted to access this local knowledge through the ethnographic method of "thick description which emphasized the close interpretation if individual acts at the small scale" (Praetzellis 2015:134).

Keith Muckelroy (1978) also argued for the inclusion of ethnography in material culture studies to better understand the meanings and social dynamics of objects in societies. While direct ethnography is impossible in this case, modern piracy is limited and utilizes wholly different means, cross-cultural generalizations will be drawn from historic trades and craftspeople in a “cognitive-processual, rather than post-processual methodology” (Trigger 2006:476). An intensive ethnographic study is beyond the scope of this analysis, but personal experiences and observations from working in historic trades will help to inform conclusions about the *QAR* tool collection.

Object Biography

One method of teasing out the meaning of material culture in society is through the lens of object biography. This approach seeks to document the construction, manufacture, usage, and disposal of an artifact to understand what meanings and functions it may have served throughout its life. Every cultural object carries information…

> About the material from which it was made, the way in which it was assembled, and every incident which occurred in its life… Every object which is consciously made or selected by a human being contains shape, color, and texture which an individual has created or chosen from a range of possibilities (Caple 2000:29).

The choices made while manufacturing an item can give insight about the relative value or purpose of an object, while modifications to an item reflect the choices and motivations of users and individual actors.

In any society, especially modern societies, individuals are caught between prevailing cultural structures, and the innate human desire to bring personal meaning and “value order to the universe of things” (Kopytoff 1986:76). When artifacts are investigated for cultural information,

> all objects contain aspects which are definable as being 'documents of the past' and aspects which are 'aesthetic.' No object is totally devoid of either aspect, and thus all objects lie between the two extremes (Caple 2000:29-30).

Similarly, Igor Kopytoff (1986) identifies opposing influences of commoditization and singularization, wherein objects fall along a spectrum of unremarkable commodities to unique singularized items. Because all objects are products of human activity, the physical evidence of commoditization and singularization can be closely tied to and explained in terms of human habitus and agency.

Commoditization and Habitus

Habitus refers to how culture is created and transmitted through relative standardization of people's daily routines, expressions, norms, and shared beliefs of the society in which they live (Praetzellis 2015:144). Pierre Bourdieu (1977) investigated the ways individuals functioned within existing behavioral patterns. "His concept of habitus stressed the extent to which learned, but unconscious, forms of behavior limited the ability of individuals to act as free agents…" and ultimately inhibit change (Trigger 2006:469-470; 520).

In modernizing societies, commodity items are relatively standard and stable units of exchange. They may take the form of a bale of cotton, a cask of wine, or a barrel of axe heads. These items come in standard sizes and shapes so values can easily be ascribed and exchanged for items of similar value. Everything from exchange rates to a method of shipping and packaging commodities is regulated by social and cultural norms, or habitus.

Applied to cultural objects, habitus, and commoditization work to influence and regulate the forms that material culture tends to take. In the case of tools, objects like claw hammers are easily identifiable and nearly identical in form from early Roman examples, to 18th-century pirates, and even those found in modern hardware stores. Whether due to the demands of basic functionality, or the conservative nature of folk cultures like craftspeople and sailors, many tools exhibit little variation over time (Deetz 1977:41). Societies order "the world of things on the pattern of structure that prevails in the social world of its people… societies constrain both these worlds simultaneously and in the same way, constructing [sic] objects as they construct people" (Kopytoff 1986, 90). People in modern societies yearn for singularization, to bring meaning to things, and often do so on an individual basis. Even "principles as mundane as… the longevity of the relation assimilates [objects] in some sense to the person and makes parting from them unthinkable" (Kopytoff 1986:80). Humans can create meaning in otherwise unremarkable things from no more than prolonged habitus. This illustrates that nothing is ever strictly singular or a commodity, rather all objects lie on a continuum between the two concepts (Kopytoff 1986:87).

Agency and Singularization

In contrast to habitus where people are hostage to social forces, the concept of agency suggests "individuals are active creators of their own lives" (Praetzellis 2015:109). While the effect of social norms and expectations can be significant, individuals will always find ways to resist. Even within preconceived patterns, people will act in diverse ways, finding small ways to express their individuality within a pre-existing structure (Johnson 2010:237). In modern societies, the pressure of social norms can be overwhelming at times, and there is often an absence of visible prestige markers or ways for individuals to set themselves apart. This drives people to create markers of prestige or individuality by attributing "high but non-monetary value to aesthetic, stylistic, ethnic, class, or genealogical esoterica" (Kopytoff 1986:82). While all material culture is the result of human action, in modern societies singularization results from individuals executing their agency upon commodity objects. How commodities are singularized can lend clues about the values of the individual, their society, and the circumstances which prompted the modification. Repairs may reflect the value of an object or scarcity of an alternative; changes in form may be driven by changes in how an object is used or understood; decoration could indicate aesthetic choices, personal valuation, or a means to personalize and identify an object.

Conclusion

The tool artifacts analyzed here largely represent commodity items. Their forms resemble a host of similar artifacts in historical and archaeological records. These records will help determine how the artifacts were used aboard the ship. Further analysis will evaluate the extent to which individuals have executed their agency to singularize the objects. Based on the degree of singularization, conclusions may be drawn about the relative value of the objects used aboard the ship, who used them, and how. Artifacts that are between the realm of singular and commodity have the potential to show "how the forces of commoditization and singularization are intertwined" in complex and culturally specific ways (Kopytoff 1986:88). While tools are often homogenized and fade into the background of historical settings, "an eventful biography of a thing becomes the story of various singularizations of it, of classifications and reclassifications… As with persons, the drama here lies in the uncertainties of valuation and identity" (Kopytoff 1986:90).

The tools aboard *QAR* may have been part of the initial fitting out of *La Concorde*, stolen from other vessels, or part of the personal kit of an individual pirate or impressed craftsperson. Historical records, archaeological parallels, and evidence of singularization within the tools will help to paint a more complete picture of the working life aboard *QAR* and the individuals who used these artifacts.

Chapter 5: Interpretations

The tools recovered from *Queen Anne's Revenge* represent a wide range of activities that were performed onboard. While tools were often designed for specific jobs, they were frequently repurposed in creative ways and to solve an array of problems. This analysis describes the tools recovered in the collection, identifies the common or standard application of the tools, and discusses ways that some tools may serve other functions. Historical documents and illustrations aid in identifying the function and applications of these artifacts. Comparisons are drawn to tool finds from other contemporary maritime and shipwreck sites as available.

Hammers

The term hammer can be applied to a broad range of striking tools. Handheld Neolithic hammer stones used for shaping projectile points evolved into hafted tools. The advent and evolution of metallurgy gave rise to bronze and iron striking tools, many of which look very similar to hammers found in modern hardware stores. Generally, hammers are used for driving and peening over fasteners like nails, rivets, bolts, and drifts. Hammers can also be applied to any situation where abrupt force may be useful; this can include sticking two or more pieces of material together, unsticking a material from a tight space, demolition projects, pulverizing material into smaller pieces, or any activity in which percussive maintenance might yield a desirable result.

Generally, a hammer features a metal head with at least one flat striking face. Hammers are usually found hafted with a wooden handle inserted through a hole in the approximate center of the tool body. A nail or other wedge is driven into the top of the handle, forcing the end grains apart and securing the tool to the handle through friction. Some styles of handles are secured by means of metal straps welded to the head and fastened to the sides of the handle. This is a sturdy method of attachment but sacrifices some of the spring gained from the handle, making it a less efficient driving tool than a socketed hammer (Bealer 1995:163). Hammers are designed to be used in one hand, while larger striking tools with longer, thicker handles are typically known as mauls or sledges, and are designed to be used with two hands. Despite the lack of fully preserved handles, all the striking tools recovered from *QAR* are of a size and weight that is consistent with one-handed uses and thus are categorized broadly as hammers (Salaman 1990:218).

1403.006- Riveting Hammer

A small hammer head 5.9 inches long with a fragment of mineralized wood handle in the socket (Figure 8). The striking face is roughly square measuring 1.8 inches across, and the opposite end tapers to a flat cross-peened end. This artifact is constructed of wrought iron and is highly degraded along the horizontal plane which reveals the grain of the original iron ingot. This small hammer could be categorized as a clench hammer, riveting hammer, or a joiner's bench hammer. Riveting hammers are typically used for peening over or clenching the ends of light copper nails (Figure 9, right) (Horsley 1978:114-115).

FIGURE 8. 1403.006- Riveting hammer. Image courtesy of NCDNCR.

This artifact most closely matches a “French pattern” hammer with a “square face, square body, flat underside, and a cross peen with no side chamfers” (Figure 9) (Salaman 1975:225). According to Salaman’s (1975:225) *Dictionary of Woodworking Tools,* hammers of this type are illustrated in medieval pictures and used as a joiner’s hammer in Europe. Because of the French origin of *La Concorde*, it is tempting to say this artifact is French in origin. However, this hammer form is common across many nationalities and it is impossible to positively identify its provenience.

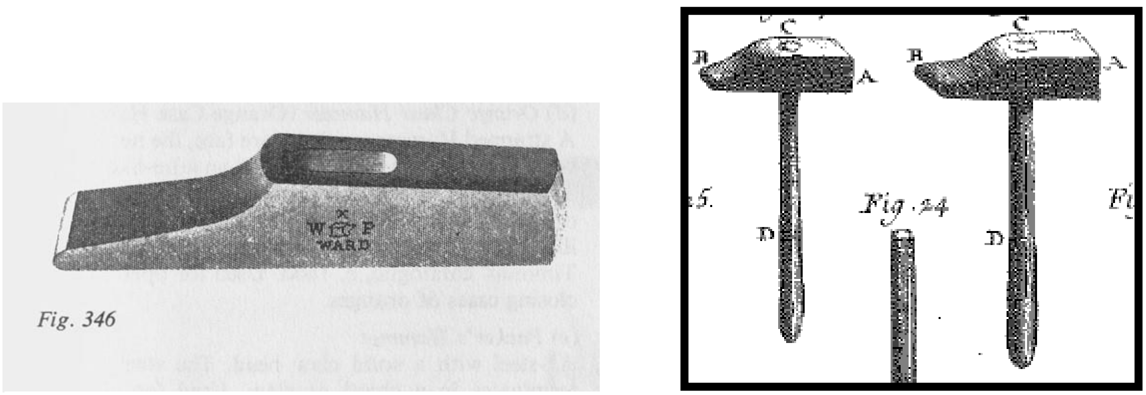

FIGURE 9. (Left) French Pattern hammer (Salaman 1975:225). (Right) Locksmith forging tools (Diderot 1978c:2150).

<u>1749.008- Carpenter’s Claw Hammer</u>

This artifact (Figure 10) is a small claw hammer 3.5 inches long with a round striking face 0.9 inches across. The opposite end of the tool has two flattened prongs. A small portion of the mineralized wooden handle remains in the socket. These types of hammers are common carpenter’s hammers in both terrestrial and maritime contexts. The flat striking face is used to drive fasteners, while the curved prongs were used to pry items apart and remove fasteners. Sheathing hammers look very similar but have relatively longer tines. Unfortunately, without a comparative example from the ship, it is impossible to determine the exact type, but this artifact could have been used for both standard carpentry and for sheathing a vessel (Horsley 1978:112,114). Hammers of this kind have been used since Roman times and are frequently

FIGURE 10. 1749.008- Carpenter's claw hammer. Image courtesy of NCDNCR.

depicted in medieval illustrations (Figures 11-13) (Salaman 1975:221). Remarkably similar hammers can be found in modern hardware stores, proving that sometimes basic functionality cannot be significantly improved upon even after centuries of technological advancement.

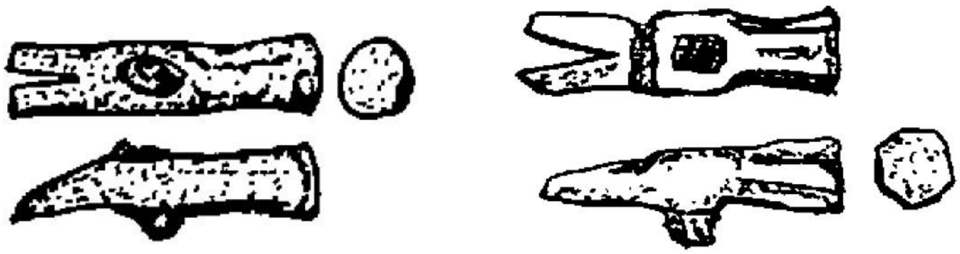

FIGURE 11. (Left) Claw hammer (PR86 146-7) excavated from Port Royal. Approximately 3.5 in. by 0.75 in. and suggested application in cabinet making or other finish crafts based on size (Franklin 1992:109). (Right) Claw hammer (PR84 230-1) excavated from Port Royal. Approximately 3.5 in. by 0.9 in. (Franklin 1992:107).

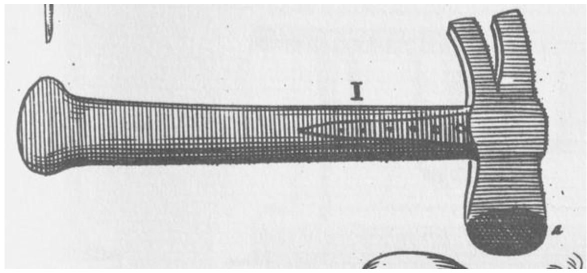

FIGURE 13. Carpenter's hammer (Moxon 1703:Plate 8).

FIGURE 12. Nail remover recovered from Late Hellenistic Kizilburun shipwreck which exhibits prongs for getting underneath and removing fasteners and like a claw hammer. Used by striking the flat face with a hammer to pry the fasteners from the working material but lacks a socketed handle to improve mechanical advantage and leverage of the user on the nail (Rash 2012:91).

2439.003- Ship's Pin Maul

This tool (Figure 14) is a small ship's pin maul measuring 6.1 inches long with a flat, octagonal striking face 1 inch across. The other side of the tool features a tapering octagonal poll. A small fragment of the mineralized wooden handle remains in the socket of the tool. The striking face was used to drive pins and bolts through pre-drilled holes in timbers. The pointed poll end was used to drive fasteners below the surface, so tools like an adze could be used to shape the timber without getting fouled and damaged on metal fasteners (Horsley 1978:117-118). Striking implements of this sort are commonly found in shipyards and aboard vessels for construction and repair work (Salaman 1990:233) (Figure 15).

FIGURE 14. 2439.003- Ship's pin maul. Image courtesy of NCDNCR.

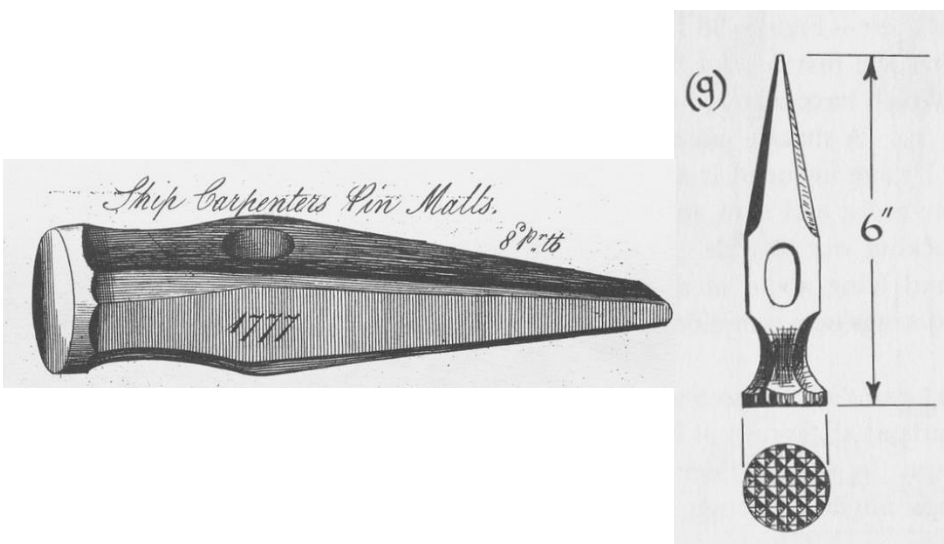

FIGURE 15. (Left) Ship Carpenter's Pin Maul (Roberts 1976:135). (Right) Ship’s pin maul (Horsley 1978:119).

<u>3170.005- Shackle Pin Maul</u>

This artifact (Figure 16) is identified as a small, well-preserved shackle pin maul constructed from wrought iron and measuring a total length of 6.5 inches. A small fragment of the wooden handle is preserved in the socket of the tool. The tapered end of the pin maul could be used to strike fasteners down below the surface of the wood and/or to forcefully free a shackle pin which was stuck or under a heavy strain. The flat striking face is square with rounded corners, approximately 2.4 inches tall, and was used to drive fasteners, and peen over rivets. When viewed head on, the striking face shows a pattern of wear, degradation, and distortion in the viewer's lower right corner.

FIGURE 16. Shackle pin maul. Image courtesy of NCDNCR.

A broadly similar, and slightly larger style of sledge was recovered from excavations in Port Royal, Jamaica. One well-used tool exhibits a similar pattern of wear along the lower and viewer's right sides of the striking face (Figure 17) (Franklin 1992:24).

FIGURE 17. 3170.005- Artifact RM.S.3 from Port Royal excavations (Franklin 1992:124).

<u>3433.001- Carpenter's Hammer or Lathing Hammer</u>

This preserved iron hammer (Figure 18) is 7.9 inches overall, with straps securing it to a partially preserved wooden handle. The round striking face measures about 2 inches across and has an incised cross-hatched pattern. The opposite end of the tool is a narrow cutting hatchet blade. There is a pattern of stringers horizontally along the blade. Stringers are bands of iron that have deteriorated at different rates due to varying levels of iron purity during the forging process, and indicate this artifact is of wrought iron construction. Tools like this are seen in a variety of trades and applications (Figures 19-20). This artifact most closely resembles a lathing hatchet and used by plasterers. The striking face was used to drive fasteners and secure wooden lath to structural timbers. The cutting edge was used to cut the extra length of wood to size. The flat line along the top of the tool is characteristic of lathing hammers and is designed not to catch or impede the users' swing when working near a corner, ceiling, or other confined spaces (Salaman

FIGURE 18. 3433.001- Carpenter’s hammer/hatchet, or lathing hammer. Image courtesy of NCDNCR.

1990:238). Tools of a similar form are also used by masons, carpenters, and warehouse workers. This artifact lacks the notch in the hatchet end used for pulling nails, a feature that is a hallmark of the lathing hammer. According to Sloane’s (1964:21) *Dictionary of Early American Tools,* hammers of this sort “became the favorite carpenter’s tool to replace the awkward cooper’s

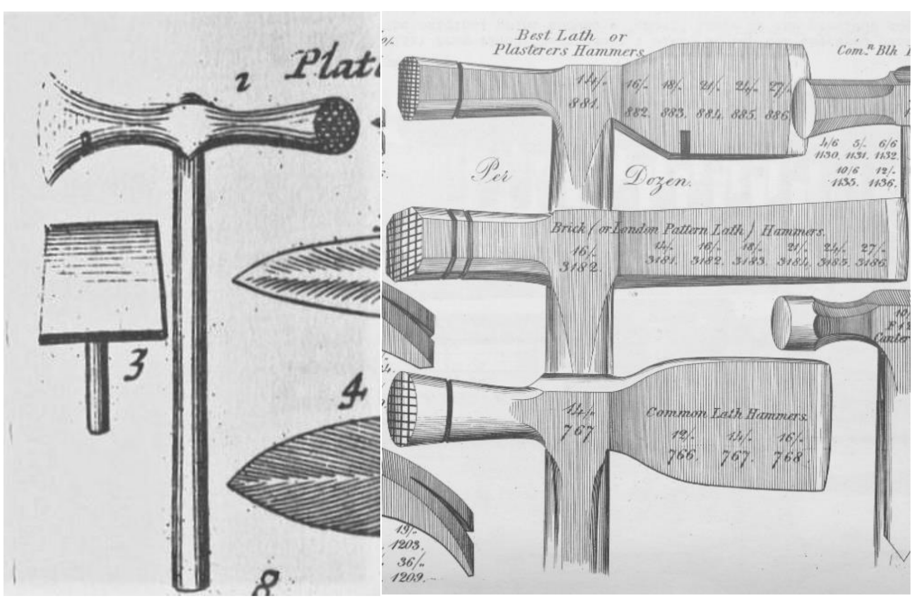

FIGURE 19. (Left) Bricklayers hammer (Moxon 1703:237). (Right) A selection of lathing hammers (Roberts 1976:114).

hatchet." In the context of *QAR*, it is most reasonable to expect this tool to have been used for light carpentry or for opening storage cases or boxes.

Hammers and hatchets both sometimes featured metal straps welded to the hammer head and fastened along the length of the handle. This secures the tool firmly into position on the handle, but limits the spring gained from the handle, making it a less efficient driving tool than a socketed hammer (Bealer 1995:163). This lightweight tool does not have the width to accommodate a socketed handle, further suggesting this tool was used in light carpentry applications.

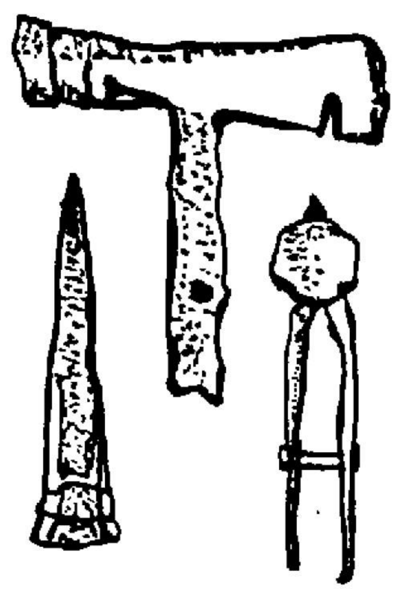

FIGURE 20. Lathing hatchet (RM.H.1) recovered from Port Royal excavations (Franklin 1992:60).

<u>1597.013- Small Riveting or Tack Hammer</u>

This small, square wrought iron hammer (Figure 21) is not yet fully conserved, but has an overall length of 4 inches and width of 0.9 inches. It features a square striking face, a fragment of mineralized wooden handle, and tapers to a narrow cross peen. A hammer of this size and weight would not be terribly useful for driving large fasteners into solid wood. A comparative example from the excavations at Port Royal identified a similar artifact as a tack hammer, or a tool that could be used when working with fine metals (Figure 22) (Franklin 1992:113-114). It could be applied to small fasteners and rivets on objects like upholstery, shoes, or firearms.

FIGURE 22. Tack hammer (PR89 682-8) from Port Royal excavations (Franklin 1992:113).

FIGURE 21. Tack hammer (PR89 682-8) from Port Royal excavations (Franklin 1992:113).

Files

Each of the files in the collection exhibits a cross-hatched, double cut pattern of incised lines. Mill files and small finishing files have cross-hatched lines (Bealer 1995:172).

These small files would have been used for fine shaping of metal and sharpening of tools. Each tool exhibits longitudinal striations and a straw-like pattern on the interior cross section which indicates that they are constructed of wrought iron (Figures 23-24).

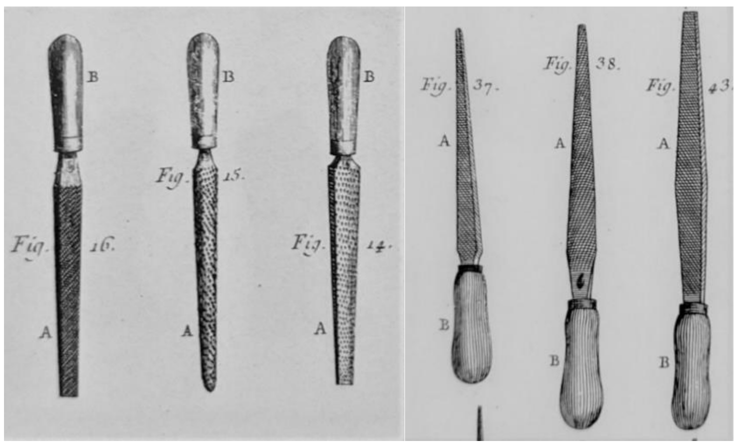

FIGURE 23. (Left) Toolmakers files (Diderot 1978a:856). (Right) Weapon maker's files (Diderot 1978a:862).

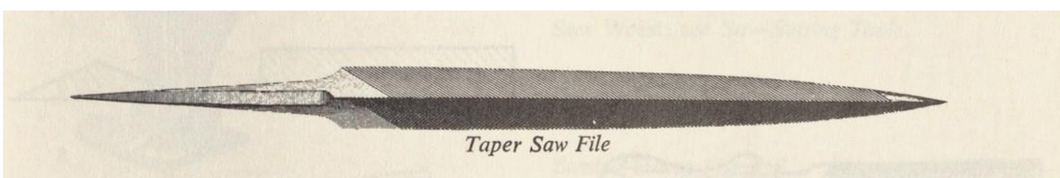

FIGURE 24. Taper saw file (Salaman 1975:439).

906.007- Square File

This artifact (Figure 25) is a middle portion of a file with a square cross section preserved to a length of 2.6 inches. This tool could be used for fine shaping of metal and sharpening of tools.

FIGURE 25. 906.007- Square File. Image courtesy of NCDNCR.

<u>1729.001- Triangular “Three Square” File</u>

This file (Figure 26) is mostly intact, measuring 7.1 inches with a triangular cross section and tapers at each end. Files of this shape are most used for sharpening the teeth of saws because the acute angle can fit deeper into the gullet and more effectively sharpen the deepest portion of the teeth (Salaman 1975:439).

FIGURE 26. 1729.001- Triangular 'three square' file. Image courtesy of NCDNCR.

<u>3457.001- Flat File</u>

This flat file (Figure 27) was mostly degraded, but the form was preserved by casting the void with epoxy. The entire preserved length of the tool measures 7.2 inches, by 0.6 inches wide. The base of the handle tapers to a point, which fits into a socket in the wooden handle. Flat files could be used to sharpen any manner of edged tools, or even out the heights of flat saw teeth (Salaman 1975:439).

FIGURE 27. Flat file. Image courtesy of NCDNCR.

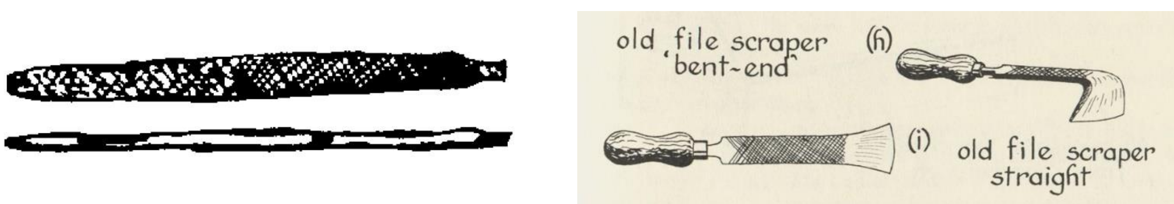

FIGURE 28. 3457.001- (Left) Flat file (PR85 1035-9) recovered from the 1692 level of Port Royal, preserved by epoxy casting. Double cut pattern of lines, showing signs of wear at the tip. Preserved length of 8.4 in long, 0.6 in. wide, and 0.25 in. thick. Rasp pattern of punch marks on opposite side of tool (Franklin 1992:99). (Right) Examples of repurposed flat files (Horsley 1978:153).

Gouges

Gouges and chisels are used to shape wood and are fundamental tools used in carpentry and other trades. Where chisels are straight and have a flat cutting face at the distal end, the concave cutting edge of a gouge is used for hollowing out voids in woodworking. Heavy tools like this were used in conjunction with a mallet and had to withstand repeated striking on the heel end of the tool (West 2017:645).

345.016- Boat Builder's Gouge

This artifact (Figure 29) is largely preserved by means of epoxy to a total length of 9.7 inches, with a narrow metal core apparent within the epoxy casting. The iron remains of the artifact are largely obscured by the epoxy, but the straw-like appearance of the exposed metal indicates this tool is constructed of wrought iron. The working end of the tool has a concave, half cylindrical shape, but the cutting edge is obscured by a large glob of epoxy. The shaft of the tool is iron with a flat striking head that appears to be mushroomed over from repeated use. The handle is fully iron, rather than tapering to a tang that seats into interchangeable wooden handles (Figures 30) like the files from *QAR.* The all-iron construction is typical of a boatbuilder's gouge (Figure 31) and indicates that it was used for heavy applications and to remove large quantities of dense material.

FIGURE 29. Boatbuilder's gouge. Image courtesy of NCDNCR.

FIGURE 30. (Left) Gouge-tipped chisel (NS2.A9.1a) from Port Royal. The blade is 1.1 inches across at the widest point and has a socketed handle (Franklin 1992:82). (Right) Gouge (Moxon 1708:Plate 4).

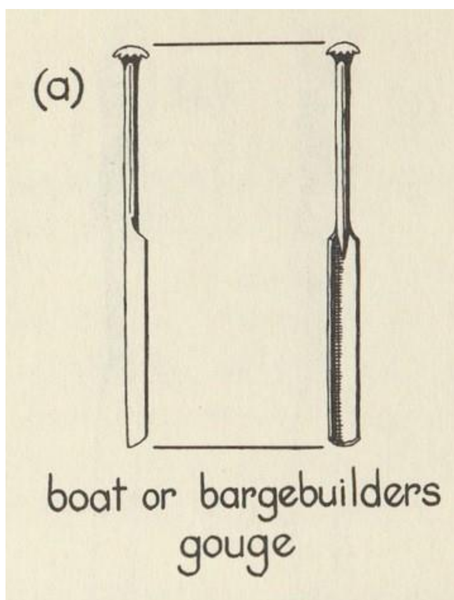

FIGURE 31. Boat or barge builder’s gouge (Horsley 1978:122).

1476.010- Gouge

This fragment of tool shaft (Figure 32) identified as a gouge. It's preserved to a length of 8.1 inches and has longitudinal striations indicating wrought iron construction. The shaft has a roughly square cross section and neither end of the tool was successfully conserved (Figure 33, right).

The working end of the tool has a concave, half cylindrical cross section (Figure 33, left). The cutting end of the tool did not survive but is partially represented with an epoxy casting. The casting illustrates the concave shape of the working end, which appears to be too thin to effectively be used as a gouge. Comparing the conserved artifact with x-ray imaging, however, reveals this tool originally had a much longer iron handle and the cutting edge of the tool flared into a wide, sturdy cone of metal, much like the boatbuilder's gouge (Figure 34). Near the cutting end, a portion of fabric is wrapped around the tool and remains partially preserved, evidence suggesting this tool was carefully stored at the time of *QAR's* sinking.

FIGURE 32. 1476.010- Gouge with fabric. Image courtesy of NCDNCR.

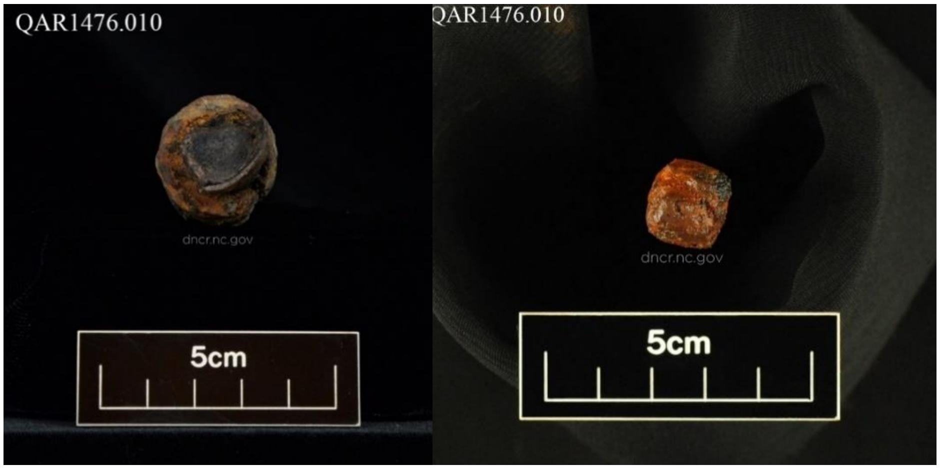

FIGURE 33. (Left) Cutting end of auger bit 1476.010. Image courtesy on NCDNCR.
(Right) Shank end of auger bit 1476.010. Image courtesy of NCDNCR

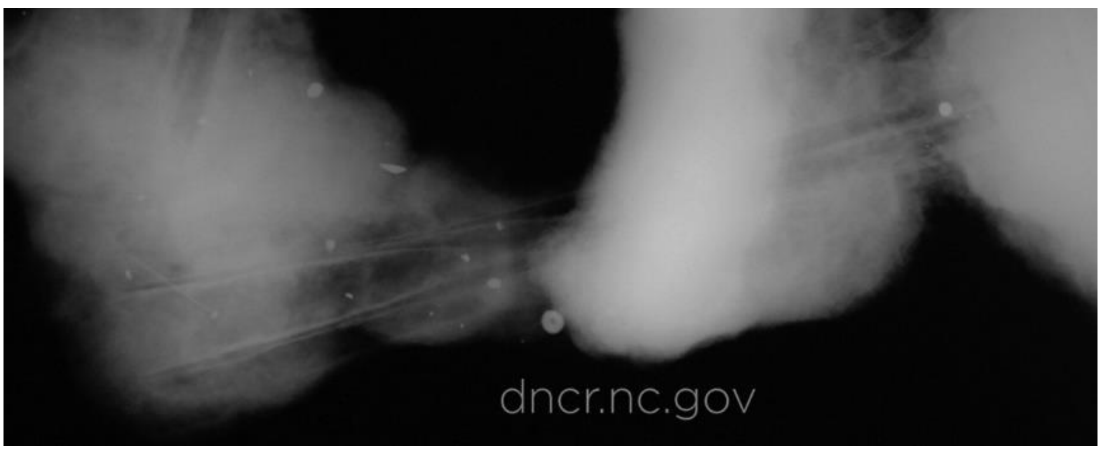

FIGURE 34. X-ray of 1476.010 in concretion shows a void which represents the original extent of the gouge blade and iron handle.

Painting

Painting is one of a seemingly endless series of maintenance tasks on board a wooden sailing vessel. Paints and other sealants were used to protect wooden surfaces and mitigate the damaging effects of sun, wind, rain, and rot. Paints were mixed using oils and colored pigments to create shades of black, white, yellow, red, blue, and green. Patterns of paint on a vessel could give clues about the identity of the ship, but even in disciplined navies, paint jobs were far from uniform into the 1800s. Vessels were commonly painted black along the waterline, with yellow above, and red or blue along the upper works of the ship (Mansfield 2002:12-13). White, black, yellow, red, and blue were common colors during the age of sail. The way a ship was painted could help identify the owner, nationality, or industry of a ship at sea, and whether the vessel was likely to be friend or foe.

Pigment samples recovered from *La Belle* offer an interesting comparison. The packing manifest of the voyage includes a variety of pigments for use as a trade good. Over 8 kilograms of mineral pigments, mostly reds and yellows, were recovered from the wreck site (Mekoli, Ray and Sheya 2017:788). On *La Belle's* voyage, vermillion would have been a very desirable commodity to trade with Indigenous people, but chemical analysis of the samples reveal that the majority of red pigments recovered were synthetically produced vermillion consisting of iron oxides (Fe_2O_3, Fe_2O_4), and red lead (Pb_3O_4), rather than the mercury sulfide (HgS) of vermillion (Mekoli, Ray and Sheya 2017:796).

<u>1106.012- Scraper</u>

This artifact (Figure 35) is a hoe-shaped scraper about 9.5 inches long (Salaman 1990:447) and features two cutting faces perpendicular to the handle. The two working edges of the tool are approximately 3.5 inches wide. The opposite end of the tool tapers to a round neck, then flares gradually into a conical socket for attaching a wooden handle.

FIGURE 35. 1106.012- Scraper. Image courtesy of NCDNCR.

Scrapers were used aboard ships to remove excess pitch and tar from freshly completed caulking jobs, or to remove layers of old treatments from wooden surfaces. A fragment of a similarly designed scraper (Figure 36) was recovered from the excavations at Port Royal (Franklin 1992:122). It is significant that this uncommon form of scraper has been recovered

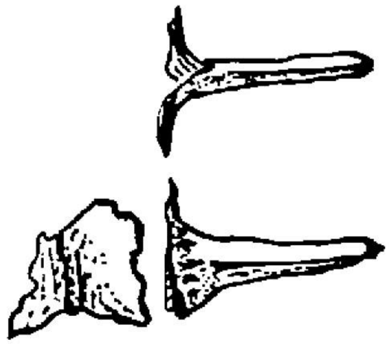

FIGURE 36. Scraper artifact SP.1.3 from Port Royal excavations (Franklin 1992:122).

from the wreck of a pirate ship that operated in the colonial western Atlantic and the colonial trade hub of Port Royal. This connection seems to suggest that this kind of scraper has stronger ties to activities in the New World rather than continental Europe. It may further be supposed that this artifact came aboard *La Concorde/QAR* on one of its voyages in the Caribbean.

<u>1106.011- Red Lead Pigment</u>

When working on concretion 1106.000, several small fragments of concretion broke away to reveal a bright red-orange color inside (Figure 37). These small conspicuous flakes were collectively assigned an artifact number and given a preliminary identity as pigment. X-ray fluorescence (XRF) elemental analysis verified that the sample pigment was composed primarily of lead, with traces of iron. Research partnerships with Joyner library allowed the *QAR* sample to be tested against a control sample of red lead which was visually identical in color. Elemental analysis returned nearly identical XRF signatures except for traces of iron which leached from iron artifacts within the concretion. Red lead is a common pigment used in an array of global contexts since ancient times (Eastaugh 2008:235).

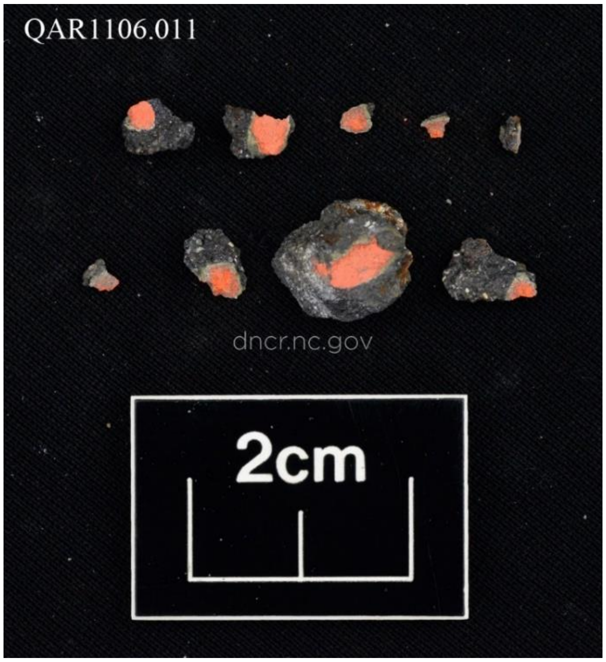

FIGURE 37. 1106.012- Red lead pigment. Image courtesy of NCDNCR

1106.006- Graphite

This small mineral flake (Figure 38) was removed from concretion 1106.000 during the break down process. Identified as graphite, this mineral has been used as a pigment since ancient times and was ground to a fine powder and mixed with oils to create a black color (Eastaugh 2008:179). However, this artifact's function as a paint pigment is tentative. Fragments of what appears to be pencil graphite are found throughout the site, as well as highly graphitized pieces of iron (Kimberly Kenyon 2020, pers. comm.). So, the suggested identification of this artifact as graphite pigment is based largely on its association with the paint scraper and red lead pigment.

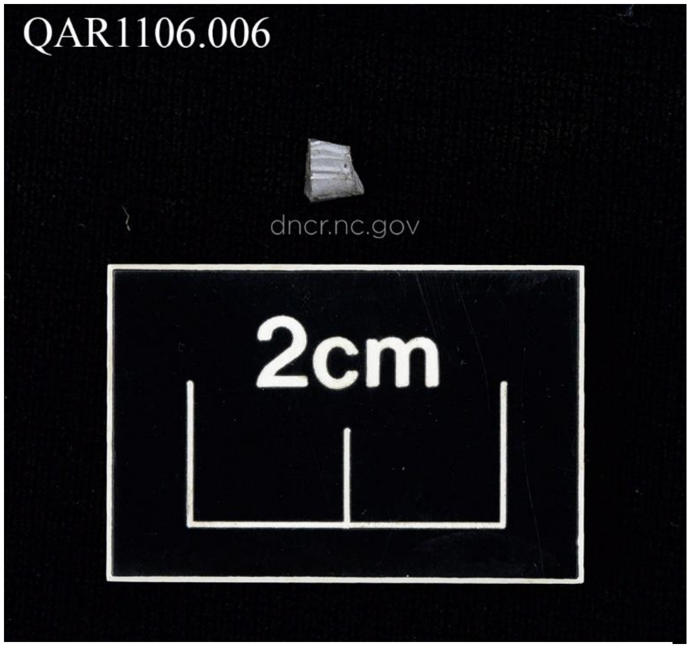

FIGURE 38. 1106.006- Graphite. Image courtesy of NCDNCR.

<u>1519.000- Muller Stone</u>

This artifact is a dome-shaped rock (Figure 39) measuring 6.3 inches tall and 5 inches wide with a flat bottom surface. The stone is a size and shape that fits comfortably in the palm of the hand while grinding pigment against a solid surface. XRF testing was completed on the grinding surface in 2009 to determine if any elemental residue of pigments could be found. This artifact was recovered with an iron nail concreted to one edge. Areas where concretion product remained returned high XRF readings of calcium, iron, and sulfur, all elements involved in the formation of iron concretions in marine environments. Since the first XRF analysis conducted in 2009, lab procedures for analyzing and interpreting XRF data have changed, meaning no further information can be confidently drawn from the 2009 data set (Kimberly Kenyon 2020, pers.comm.). Originally, this study aimed to conduct a new round of XRF testing and analysis, to determine if the stone could yield more information about the elements and pigments it was used with. However, due to the Covid-19 pandemic and the shuttering of many aspects of public life, access to the stone at the North Carolina Maritime Museum was restricted.

FIGURE 39. QAR1519.000- Muller stone. Image courtesy of NCDNCR.

Jacks

Jacks are tools used to lift, leverage, and move all manner of large and heavy objects. A long, toothed iron bar is referred to as the rack and transects a metal gear box. One end of the rack is flat and features a shallow u-shaped space to help control a load. The opposite end curves outward at approximately 90 degrees and ends in two forked points (Figure 40).

A user would apply rotational force to the handle of a jack. Internal gearing multiplied the rotational force and transferred it to the rack. As the user turned the handle a small pawl would fall into place along the ratchet gear to support the load and prevent it from crashing back down when the user took their hands off the crank. This rack and pinion leverage transformed rotational force to linear motion of the rack (Wilde-Ramsing and Carnes-McNaughton 2018:94). This directional force was then applied to a load, a deck beam or large timber which needed to be maneuvered or supported to effect repairs on the ship.

Some jack casings were reinforced with iron plates or bands to support larger loads (Figure 40-43). Moxon (1718:125) includes the jack among tools used to manage heavy timber, while Diderot (1978c:2022) depicts a similar tool being used by sculptors to maneuver blocks of marble. Jacks were standard issue equipment on Dutch East India Company vessels and were used to support cannons while repairing gun carriages (DiMucci 2018). Across trades and professions, jacks allowed the user to harness mechanical advantage to multiply their force and thereby manipulate large, heavy, or otherwise cumbersome objects. Mechanical jacks have also been recovered from the English slave ship *Henrietta Marie* (1700), *Cabin Wreck* (1715), and on several of the 1715 Spanish Fleet ships in Florida (DiMucci 2018:9; Wilde-Ramsing and Carnes-McNaughton 2018:192).

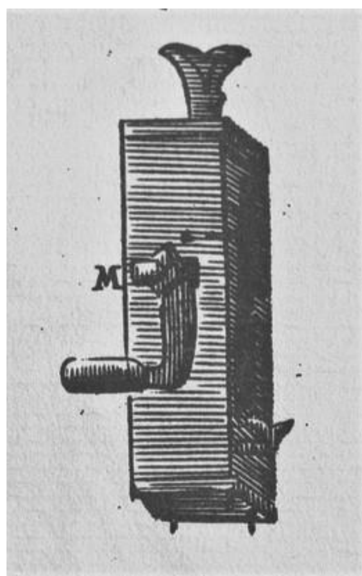

FIGURE 40. Framing tools (Moxon 1718:161).

<u>60.000 And 60.013 - Jack</u>

This artifact represents the iron remains of a mechanical jack with an overall preserved length of 36 inches. The gear box features a square-shaped protrusion, where a handle would have been attached to turn the gears and lift or lower a load. The pawl that was used to lock the jack in position has not been preserved (Figure 41). Areas of the toothed bar have degraded to reveal linear stringers, indicating this part is of wrought iron construction.

The details of the internal gearing are obscured by the iron casing and corrosion products, so little else can be said about the exact mechanics of this object at this time. An intensive, engineering-based analysis of this artifact could reveal more about the working loads it was designed to withstand, and therefore would provide a fuller understanding of the types of work this tool enabled sailors to perform.

FIGURE 41. 60.000- Jack. Image courtesy of NCDNCR.

A portion of the ratcheted iron rack came away from the gear box of 60.000 during conservation and was assigned an artifact number 60.013. There is no image of 60.013 by itself or with a scale bar, so it is depicted above alongside 60.000 and has an estimated length of 17 inches (Figure 42). Based on contemporary illustrations (Moxon 1718:161), it appears that this tool was in a fully retracted position at the time of sinking and was likely not in use. Fragments of wood recovered from the gearbox represent the remains of the wooden box which encased the mechanical portions of the jack.

FIGURE 42. 60.013 pictured alongside 60.000. Image courtesy of NCDNCR.

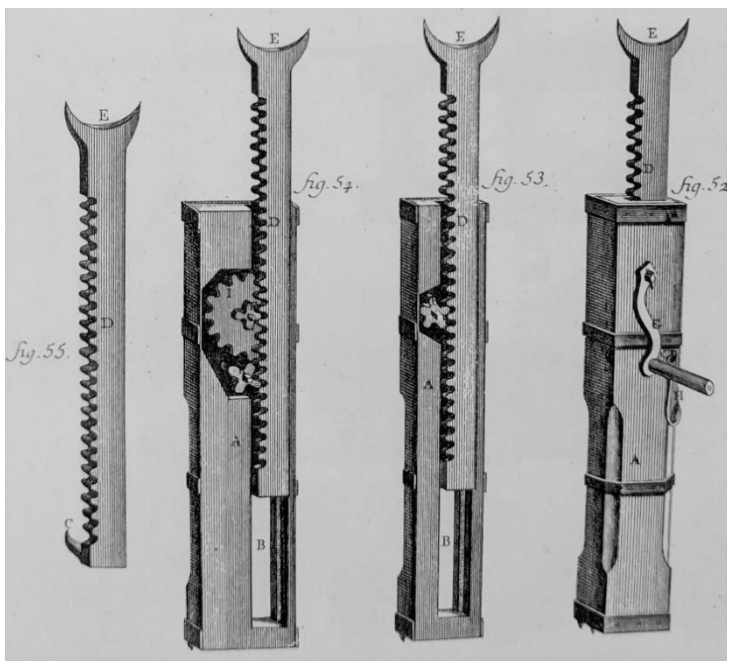

FIGURE 43. Carpenter's tools (Diderot 1978a:233).

1319.005- Jack

This artifact (Figure 44) represents an iron jack of a similar size and construction to 60.000. The toothed iron rack is conserved as a combination of iron and epoxy to an overall length of 30.5 inches. The top end of the bar does not have the u-shaped tabs conserved, like those seen on 60.000. This tool features an intact iron handle which is constructed from a square iron bar which has been twisted and formed into an S shape. One terminal is preserved and curves away from the body of the jack at a 90-degree angle. The shape is designed to catch the heel of the operator's hand as they apply clockwise rotational force to the mechanism. This is

FIGURE 44. 1319.005- Jack. Image courtesy of NCDNCR.

consistent with illustrations depicting users lifting heavy objects supported on the horizontal top end of the bar. The opposite end of the handle is not preserved, but it likely to have originally been similarly curved, to preserve rotational symmetry.

Pry bars

Another method of lifting and maneuvering heavy loads makes use of simple leverage. From a wooden branch or pole, to wrought iron pry bars and modern hardened steel crow bars, the basic method of creating mechanical advantage through levers has remained the same throughout human history (Figures 45-46). In maritime contexts, sailors were required to maneuver all manner of heavy loads including cargo, timbers, and cannon.

In the case of cannon, each gun was ideally equipped with two pry bars, one for each side so it could be lifted and adjusted evenly. Two pairs of pry bars were found on *QAR* in two different concretions (1955.000 and 3443.000) and in close association with cannons. Based on this small sample size, it appears that each pair consisted of a long narrow bar about 48 inches long, and a somewhat stouter tool about 40 inches long with a pattern of chevrons on the forked end. It is unclear if these two tool forms served different purposes in gunnery applications.

QAR was reported to be carrying 40 to 44 guns (Johnson 1724), translating into 80 to 88 pry bars if the vessel was fully equipped. It stands to reason that any of these gunnery tools could be repurposed for carpentry or repair work at any time. However, a prudent carpenter would have known that in the thick of combat they are likely to need more than gunnery crows. Because damage control measures often need immediate attention, carpenter's mates would have needed to know where to find these tools quickly and thus likely would have had their own carpentry crows. It is unclear whether there is a difference between gunnery crows and carpentry crows, and there is not yet a large enough sample size from *QAR* to help inform this question.

FIGURE 46. Crow (NS2.A6a.1b) excavated from Port Royal, measures 18.9 in. long. The round stock measure approximately 0.75 inches while the flattened end is 1.1 in. wide and 0.25 in. thick (Franklin 1992:97).

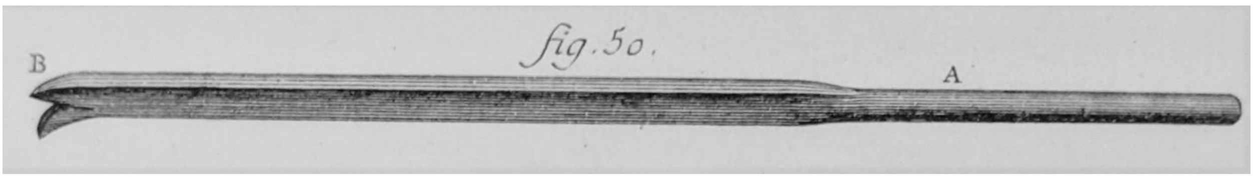

FIGURE 45. Pry bar (Diderot 1978a:233).

<u>1724.010- Pry Bar</u>

This wrought iron pry bar (Figure 47) measures a total of 40.5 inches. One end is rounded and features a tapered spike (Figure 48, left). The opposite end has a roughly square, but quite degraded cross section with two, flattened, forked prongs. Some tar residue remains between the two prongs, suggesting that the tool was used to pry at hull sheathing and maintain parts of the hull (Figure 48, right). One prong is bent and based on the width and strength of the metal at this point, the damage likely occurred after deposition rather than during its use life.

FIGURE 47. Pry bar. Image courtesy of NCDNCR.

FIGURE 48. 1724.010- (Left) Spike end of pry bar. Image courtesy of NCDNCR. (Right) Claw end of pry bar. Image courtesy of NCDNCR.

<u>3443.010- Pry Bar</u>

This wrought iron pry bar (Figure 49) measures 25.25 inches and is broken at one end. The intact end of this tool has a square cross section that transitions into a round bar (like Figure 45), features two flattened prongs, and a series of chevrons near the prong ends. It is unclear what purpose or meaning this chevron pattern serves, but the depth of the marks and density of material strongly suggests that these tools were marked this way at the time of forging, and thus the chevrons are not a mark of individual personalization.

FIGURE 49. 3443.010- Pry bar. Image courtesy of NCDNCR.

3443.012- Pry Bar

This wrought iron pry bar (Figure 59) measures 48 inches overall and has a preserved width of about 1.4 inches. The artifact is bent in the middle at a 90-degree angle. This damage that was likely sustained from tumbling cannons during the wrecking event or as the site deteriorated. This pry bar has prongs on one end, and a round point at the other like most of the pry bars from *QAR*, but it does not feature the chevron pattern seen on square, forked end of similar tools.

FIGURE 50. 3443.012- Pry bar. Image courtesy of NCDNCR.

1955.046- Pry Bar

This wrought iron pry bar (Figure 51) measures 46.8 inches in overall length with a maximum width of 2.4 inches. Much like 3443.012, the forked prong end has a square cross-section. The opposite end has a round cross-section and appears to taper but is quite degraded at the tip.

FIGURE 51. Pry Bar. Image courtesy of NCDNCR.

1955.051- Pry Bar

Preserved to a length of 39.5 inches, this wrought iron pry bar (Figure 52) bears a strong resemblance to the broken pry bar (3443.010) in the *QAR* assemblage. This tool has a square cross section and tapers to a round point on the opposite end. The chevron pattern appears on the forked end, but the purpose of this pattern remains unclear.

FIGURE 52. Pry bar. Image courtesy of NCDNCR.

Identified tools not included in this analysis

Concretion 1955.000 is slowly revealing a small vise (Figure 53). Vises were used in a wide variety of woodworking and metal working trades, and in any situation where one might need to hold a piece of material steady while drilling, hammering, filing, or otherwise shaping a piece of work. The details of how the vise was mounted remain partially obscured by concretion products. However, based on size it is likely to be a tabletop vise, which could have been moved and installed in different parts of the vessel as the situation merited (Figure 53). Small vises of this kind are best suited for relatively light work, like detailed projects or finer metal working, as compared to the heavily built post vises of a blacksmith.

FIGURE 53. Vise as it emerges from concretion. Image courtesy of NCDNCR.

In direct association with the vise is a void in the concretion, which has been given a tentative identity as an iron-handled gouge. In Figure 65 the gouge is oriented horizontally in the upper third of the image, above the bright white band representing one of the iron crowbars. The lower right corner of the image also shows the advanced state of deterioration of the vise jaws, with only very thin pieces of iron appearing in the x-ray. This concretion has yielded a wide array of artifacts including tools, glass bottles, small cask hoops, and cannonballs. The neat linear arrangement of the cannonballs and the mineralized remains of a wood plank underlying much of this concretion leads researchers to theorize that this concretion represents a munitions chest that was stored alongside one of the many cannons scattered in the area. Further conservation treatment is sure to present additional evidence about the form and function of these tools, and how they play into gunnery and/or maintenance activities on the ship.

FIGURE 54. Possible gouge in concretion with pry bar and vise.
Image courtesy of NCDNCR.

Conclusion

The tools detailed above represent an array of woodworking and metalworking activities. Sailors and specialist craftspeople aboard the vessel used these tools in a variety of applications and creative ways that may not be captured in this analysis. Most, if not all of the tools are constructed from wrought iron which was the common and affordable method of manufacturing tools in the early 1700s. The tools represented are of standard forms, and exhibit little to no evidence of personalization. Patterns of use wear and protective wrappings give clues about how these tools were used and valued aboard the vessel. Site formation processes and chemical and biological degradation factors have limited the amount of fine, detailed evidence that can be drawn from these tools. However, this preliminary analysis of identified tools provides a baseline for understanding and interpreting other tool finds as conservation efforts continue.

Chapter 6: Discussion and Conclusions

Introduction

The previous chapters presented the historical and archaeological background of *Queen Anne's Revenge*, as well as the theoretical grounding on which this analysis is based. Each tool in this study was identified in consultation with historic sources, specialist texts, and other shipwreck tool collections. This chapter creates biographies for selected artifacts, directly addresses the research questions posed in this study, discusses limitations, and offers recommendations for future study of tool artifacts recovered on site.

Artifact Biographies

Painting

An unexpected finding from this study reveals that some of the tools represent a part of a painter's tool kit. It is significant on *QAR* that pigment samples were recovered in direct association with a scraper. The muller stone was recovered from a nearby unit approximately 11 feet away from the concreted scraper and pigment samples. This strongly suggests that these artifacts represent a discreet tool kit, that was stored in the stern area of the ship. Tools and other maintenance items were often stored in the *lazarette*, stern holds, and especially on converted slaving vessels like *La Concorde*, behind midships barricades to prevent enslaved Africans from gaining access to potential weapons of resistance (Rediker 2004).

Artifacts associated with painting activities were selected for biography because is it an important but relatively understudied aspect of vessel maintenance. The task of painting *QAR* fell to idlers who did not stand watches at sea. They oversaw the "port-royal, yard backing, side-yellow and white, with the oil for mixing" and the brushes to apply the paints (Mansefield 2002:110).

A painter began by preparing the surface to be treated. This meant using a scraper to remove any flaking or detached paint from previous treatments. The wrought iron scraper in the *QAR* assemblage was forged by splitting a rectangular iron bar along one edge (Figure 35). The forked ends were then bent to approximately 90 degrees and drawn out to broad flat cutting faces (Bealer 1995:351). Scrapers were sharpened in such a way that a burr formed on the underside of the blade. The user would apply firm pressure and drag the tool toward their body to remove paint, tar, or varnish from wooden surfaces. During this research only two references were found to help identify this tool as a 'hoe-shaped scraper' (Salaman 1990; Franklin 1992). It is significant that this uncommon form of scraper has been recovered from the wreck of a pirate ship that operated in the colonial western Atlantic and the colonial trade hub of Port Royal. This connection seems to suggest that this kind of scraper has stronger ties to activities in the New World rather than continental Europe. It can further be supposed that this artifact came aboard *La Concorde/QAR* on one of its voyages in the Caribbean through either peaceful or coercive means.

Next, the painter reduced organic, or mineral pigments to a fine powder using a large grinding slab and a hand-held muller stone (Figure 39). The muller stone is not so much made or manufactured, as it is shaped by its usage. The flat surface suggests that the stone was well used prior to *QAR's* wrecking.

Ground pigment was then mixed with oil and applied to the necessary surfaces. Hematite, ocher, and charcoal are among the most common and accessible pigments since Neolithic times (Eastaugh 2008:189). Red lead oxide, like the pigment recovered from *QAR*, is thought to be one of the earliest artificially produced pigments (Figure 37) (Eastaugh 2008:235). Lead was frequently used in historic maritime contexts and is still used for select applications in modern wooden sailing vessels. According to one experienced captain, who prefers to remain anonymous (2020, pers. comm.), lead paint penetrates and preserves surfaces better than unleaded paints. The presence of lead also serves to inhibit organic growth and mold that can hasten the process of decay.

Pry bars

Two pry bars 1955.046 (Figure 51) and 1955.051 (Figure 52) were selected for biography because they represent a simple but multi-purpose tool and have demonstrated an interesting depositional pattern on the site. Two paired sets of pry bars were located on site in close association with cannon finds. Each pair consists of a long round pry bar with forked claws on the end, and a shorter bar that has a square cross section and a pattern of chevrons at the claw end. The chevron pattern is set into the bar at a depth that indicates a smith struck the shapes into the surface of the hot wrought iron at the time of forging. The purpose of the chevron pattern is unknown thus far, but the rectangular stock and broad flat tines mean they would have been well suited for handling artillery and gun carriages (Atkinson 2018:5).

Ideally, two pry bars were allocated to each gun aboard the ship. As the vessel approached combat action gunnery tools like rammers, sponges, crows, and pry bars were laid on the deck near each gun so crews could quickly and efficiently operate their cannons. Gun carriages were rolled in and out of ports using block and tackle and the extra persuasion of a pry bar. These large handspikes were used to rotate the gun carriage and aim a shot fore or aft. Pry bars were wedged under the cannon while the cheeks of the gun carriage acted as a fulcrum to adjust its height (Mansefeild 2002:38). After an engagement, gunnery implements were stored in the deck beams above the gun or tucked out of the way underneath the carriage (Mansefield 2002:40).

Artifacts 1955.046 and 1955.041 are the more complete pair of pry bars and were found in concretion with an array of other artifacts. The two pry bars were recovered from site in direct association with a vise, a possible gouge, glass bottles, several cannon balls, and the remains of small casks. The cannonballs were arranged in a neat linear pattern and sat atop a plank of wood (Figure 55). Researchers propose that the concretion represents the remains of a gunnery chest

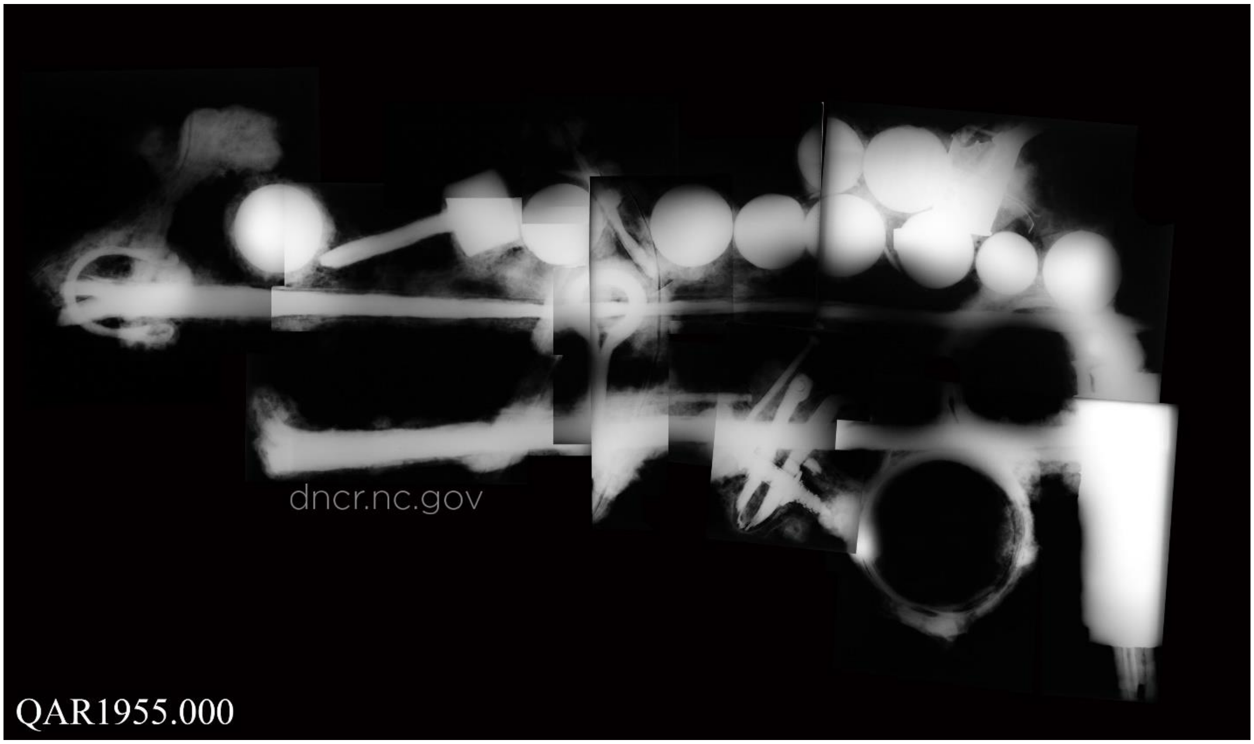

FIGURE 55. X-ray of Concretion 1955.000. Two forked ends of the pry bars are visible, and a small cask hoop is present in the lower right corner. Note the neat linear arrangement of cannon shot.

which contained cannon balls and powder kegs. At the time of wrecking a chest like this may have been stored underneath a gun carriage alongside the pair of pry bars.

Aside from creating leverage and managing loads, pry bars could be repurposed in ways limited only by human creativity. Pry bars and crows were used in carpentry applications to lift and maneuver large timbers and heavy loads. Onboard *QAR* large carpentry projects were ideally handled in calm seas and fair weather. During these periods, the carpentry crew could use any of the gunnery crows. The destructive forces of weather and war, however, wait for nothing. Damage control measures during a storm or battle required immediate access these tools to shift heavy loads. During the heat of battle, it was essential that carpenters could lay hands on the appropriate tools without simultaneously depriving gunners of required equipment. Carpentry crews likely had their own ready supply of pry bars. It is not clear whether there is a difference between gunnery and carpentry pry bars. Pitch residue between the prongs of 1724.010 (Figure 47) suggests that pry bars of similar shapes served different purposes on the ship.

Like many iron tools, pry bars can be used to conduct percussive maintenance on a wide range of things. Historical sources record sailors who used handspikes to pulverize ship biscuit into a coarse flour. They mixed this flour with chopped meat and bribed the cook to bake it into a savory dish. Another recipe mixed the flour with pork-fat and sugar that sailors aboard *QAR* would have made into a cake and passed on to cook Georges Bardeau for baking (Mansefield 2002:121-122; Ducoin 2001:28).

Files

Three metal files were found scattered around *QAR's* wreck site (Figure 24, 25, 26). These artifacts were selected for biography because excellent conservation work preserved fine details of these multipurpose tools. Linear degradation patterns reveal that each file was constructed from wrought iron stock. A blacksmith drew the stock out to the desired length and width. Square and rectangular files were shaped using a hammer to strike the piece against an anvil, applying pressure on opposite side of the piece, and rotating it 90-degrees every few strokes. To create a triangular cross section the smith used a V-shaped swage block and hammered the stock into the void.

Once the piece was shaped, lines were cut into the surface of the hot metal. Each of the files has a double-cut pattern of lines created using a short rigid chisel and hammer. “Overcutting” is the process by which one set of parallel lines are created on the tool, and “upcutting” is the second cut that creates the cross-hatched surface. (Bealer 1995:172). Double cut files are more labor intensive to produce, indicating these are tools of a somewhat higher quality than single cut files used for rough shaping (Moxon 1718:15-16). Artifact 3457.001 has a tapered proximal end, that fits into (and is obscured by) a preserved wooden handle. The fragmentary taper seen in 1729.001 indicates that different files were used interchangeably with different handles.

Files were forged so the user shaped their workpiece by pushing the file away from their body. On board *QAR* carpenters used fine files to sharpen tools like gouges, adzes, and scrapers. Tools like these would have been used by armorer Jean Jacques to shape and repair parts of the firing mechanisms of muskets and pistols. With prolonged use, the rasps on a file may become rounded over and ineffective. When this happens, the tool can be reforged and repurposed as a scrapper (Figure 28, right) (Horsley 1978:153). However, the distal end of 3457.001 was not preserved so it is impossible to speculate if this object was repurposed in this manner.

File artifacts were recovered from three areas of the site, revealing no clear pattern of how the tools were used or stored, but demonstrating how wave action and site formation processes can scatter small, light artifacts in unpredictable ways.

<u>Gouge</u>

The iron gouge (1476.010) with fabric was selected for biography because it exhibits evidence of individual agency and illustrates how conservation activities can alter the understanding of an object. Straight lines of degradation along the shank of the tool reveal that it was forged from a bar of wrought iron. A blacksmith carefully drew out the end of this tool into a flared, concave cutting edge. The handle end remained roughly round, and ended abruptly, perhaps with a mushroomed over shape to increase striking surface area. Like gouge 345.016 this tool was used to shape pieces of wood and was designed to withstand repeated, heavy impacts from a mallet. A user of this tool may have wrapped fabirc around the tool as a shock absorbing layer to improve comfort and ease of use.

The fabric wrapping on this tool may have also served as a protective measure while the tool was in storage. Master carpenter Espirit Perrin would have required cutting tools to remain sharp so he and the carpentry crew could affect repairs with maximum efficiency. The task of sharpening fell to second carpenter, Renè Duval who used metal files to maintain a sharp edge. After using the tool, a carpenter appears to have carefully wrapped the tool in a protective layer of fabric and returned it to storage. This behavior suggests that the edge of this tool was worth protecting. A similar type of behavior is observed in the contents of Packing Box Ten recovered from *La Belle*, where several draw knives were found nested together and wrapped in fabric to protect the blades (West 2017:643). Both draw knives and gouges are most effective when they remain sharp, so the activity of wrapping tools in this way could a certain level of care and valuation for the functionality of these objects.

No one explanation can be confidently drawn from the material evidence, however. Comparing X-ray images to the final artifact illustrates how significant portions of the iron tool did not survive conservation. It can also be assumed that the remaining fabric represents only a fraction of what was originally deposited with the tool. Unfortunately, due to the limitations of identifying organic material in x-rays it is impossible to know exactly how much of the tool was originally wrapped in this manner.

At the time of *QAR's* wrecking this tool was stored in the stern section of the vessel. As the ship degraded and listed to the port side, the heavy guns crashed through the side of the upper decks. This tool was recovered near a cluster of cannon but closer to the bulk of the ballast pile, suggesting that this tool was stored below the gun deck, perhaps on the orlop deck, in the *lazarette*, or in the hold of the ship.

The story of this artifact has undergone several revisions throughout this research. When presented with images and the preserved portion of this tool, it originally appeared far too small and lightly constructed to be a gouge. Comparisons drawn to historic sources suggested the tool more closely matched the size and construction of an auger bit, because they are typically smaller and have finer cutting edges. It is important, however, to maintain close communication with the conservation lab and maintain a holistic view on an artifact when interpreting materials. X-ray imaging (Figure 34) made it clear that the conserved remains represent only a portion of the evidence available for interpreting this object. To understand the full biography of this object, it is essential to consider all sources of evidence, including how the physical form and intellectual understanding of an object can be altered through conservation activities.

Shackle pin maul

This wrought iron hammer is a featured selection because it exhibits evidence of use wear on its striking face (Figure 16). Small pin mauls were used to drive fasteners and peen over rivets. The narrow, tapered end of the tool allowed the user to strike with pinpoint accuracy to free a shackle pin that may have been under load or otherwise stuck in position. The striking face features a granular pattern in the viewer's lower right quadrant. These darkened areas represent places where sulfur reducing bacteria have infiltrated the impurities and inclusions in wrought iron matrix. This pattern may be a result of differences in iron purity throughout the tool, however, because repeated force to metal can weaken the matrix the localized degradation of iron suggests that this area saw more stress during the object's use life. This interpretation is further supported by the mushroom-like deformation seen along this edge that is characteristic of well used tools.

Cooper, Edward Salter and the three French coopers from *La Concorde*, made use of hammers like this when making iron cask hoops. When cold forging and riveting cask hoops, it is easiest to maintain a consistent hammering motion and move the work piece underneath as needed, instead of changing the striking location on a stationary piece of work. The basic biomechanics of using hammers show that it is easier to apply accurate force when swinging away from the body. Trying to pull the strike towards the body can deliver equal force but increases the risk the user may hit themselves with their own tool. Based on personal experience, someone using a hammer can most efficiently transmit their force when they can maintain control of their tool. It is easiest to maintain control of the tool when the impact point is closer to user's center of mass. Therefore, the most forceful blows will be concentrated closer to the handle and the user's centerline even when attempting to strike glancing blows away from the body. Based on the location of wear patterns and deformation of the striking face, and the physical demands of riveting, it suggests that this tool was used largely by right-handed people. Of course. as part of a general shipboard tool kit, this hammer likely could have been picked up and used by a range of crew members regardless of job task or handedness. With time and experience many craftspeople will develop an ability to handle their tools ambidextrously to some degree. Whether undertaken as a way to balance bodily stresses, or simply as a personal challenge, most craftspeople will remain stronger and more capable on their dominant side. So despite individual variability, the overall pattern of wear on this hammer seems to suggest it was used by one or more people who tended to deliver more force with a right-handed swing.

Answering the research questions

- Do the tools from Queen Anne's Revenge represent a discrete toolkit of a carpenter, cooper, or other tradesperson?
- What kinds of work could have been performed with these tools and what does that indicate about the activities and work that sailors performed?

A wide range of tool types are conserved and represented in the *QAR* collection thus far. It is tempting to categorize a tool based on the trades in which they were frequently used. However, because many tools can be repurposed for similar applications across trades, it is more useful to discuss these items in terms of the activities they assisted a sailor to perform. These tools equipped a sailor or craftsperson to drive, rivet, and remove fasteners. The hammers currently represented are relatively small and light, so would have be most useful for driving small fasteners like nails and small to medium bolts. Larger bolts and pins would have demanded the use of much larger, and heavier mauls and sledges. So, the current collection would have been mostly applied to work of light to medium intensity.

The gouge and auger bit allowed a sailor to shape wood, create hollows in a timber, drill and widen holes, all essential activities when maintaining and repairing elements of a wooden vessel. A scraper can be used to remove thin layers of material, from wooden surfaces. This can include excess tar, paint, or varnish in preparation for weatherproofing treatments. The muller stone could be used to grind any manner of things including pigments or, for a creative cook, foodstuffs.

While there are several carpentry tools represented, the range of activities that could be performed with these tools suggests the conserved collection does not represent a discreet tool kit of any specific craftsperson. Further, because these artifacts could be repurposed in many ways sailors likely exhibited a great range of creative problem solving when approaching a maintenance or repair project. Fine-toothed files from the site allowed the user to shape metal pieces. This could include sharpening edges of tools and weapons or making repairs to some of the firearms recovered from the wreck. Tools like pry bars and jacks allowed the user to multiply their force and generate mechanical advantage in specific ways. This magnification could be applied to any kind of heavy load including cannon, cargo, spars, timbers, and structural elements of the vessel.

- Does the spatial distribution of tools reflect how space may have been used aboard the vessel?

A spatial analysis of tool distribution aimed to uncover whether there is any pattern to the location of tools on the site. When plotted on a site map, tool finds are concentrated in the southwest quadrant of the site (illustrated in yellow, Figure 56). Historic narratives and archaeological evidence support that the ship was wrecked facing north and listed to the port side as it degraded in place. The artifacts in this analysis were recovered from the stern area of the ship, and to the west of the baseline, which is consistent with the upper levels of the deck collapsing down along the port side of the vessel. Two of the pairs of pry bars were found among a scatter of cannon, which support the theory that these paired tools were used largely for gunnery applications. It is important to note that the overall tool distribution also almost exactly matches the extent of site excavation to date. At this point, excavation, conservation, and analysis is not yet complete enough to make a more detailed estimate about where most tools

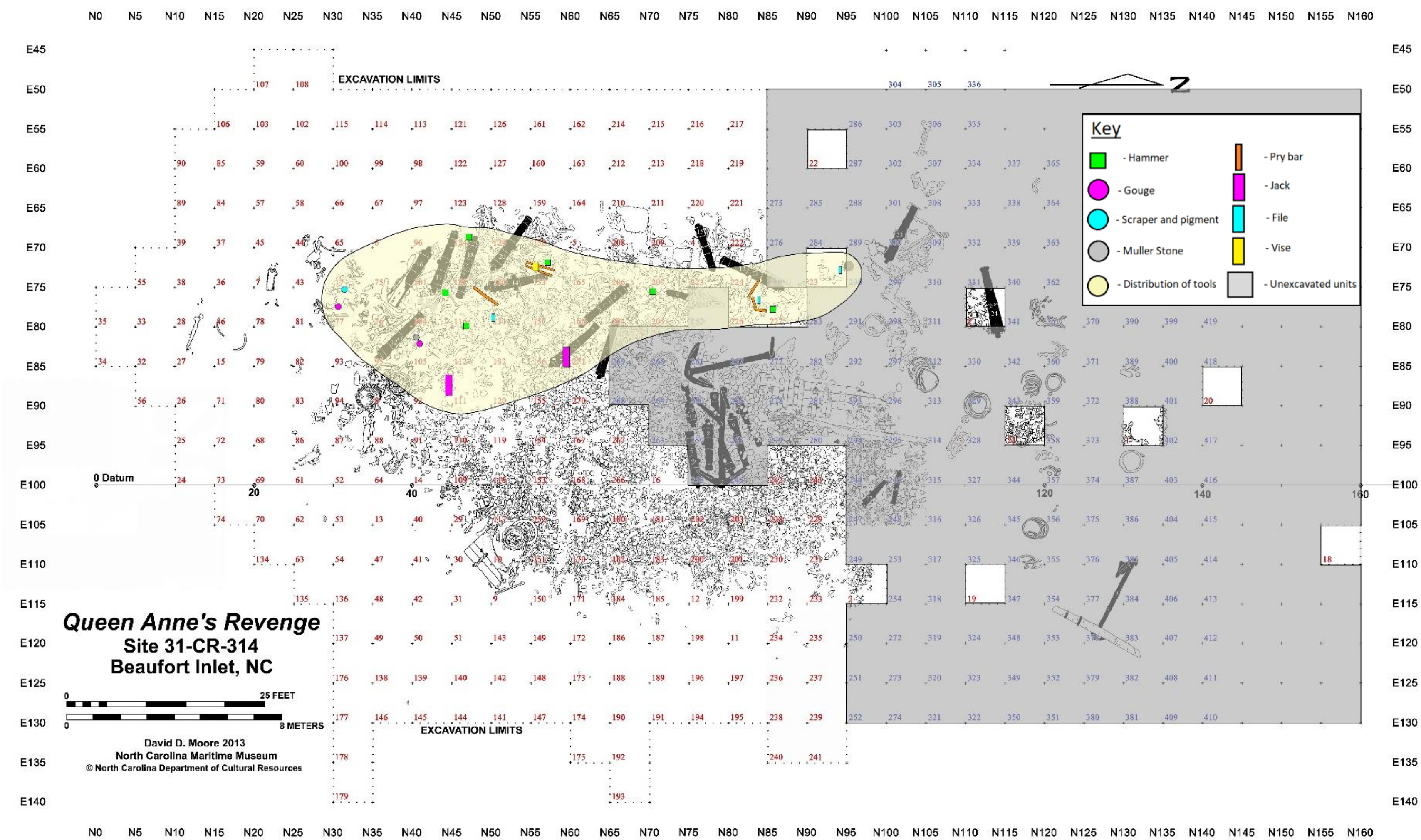

FIGURE 56. Site map with tool finds plotted. Grey area represents unexcavated units. Image courtesy of NCDNCR, modified by author.

were stored aboard the vessel. The spatial correlation of cannons and paired pry bars, however, supports historic narratives about how and where gunnery tools were stored.

- To what degree are tools in this collection consistent with other contemporary shipwreck assemblages?

The artifacts recovered from *QAR* are largely consistent with tool artifacts recovered from other shipwreck sites. *Vasa* (1626) and La Flota (1733) wrecks yielded several hammers, gimlets, and gouges. Many tools recovered from *La Belle* (1686) served similar functions to the ones on *QAR*, but many were discovered in sealed containers like boxes or casks. This is because each vessel was sailing with a different objective at the time of sinking. Where *La Belle* was a vessel of colonization and exploration laden with trade goods, *QAR* was a was engaged in raiding, piracy, and transatlantic trade.

Other discrepancies between tool collections can be attributed to the different preservation conditions on site. Shipwreck finds in northern latitudes, like the mid-16th century Red Bay vessels and *Vasa*, often feature excellent preservation of wooden artifacts. In these conditions, items like gimlet and auger handles are well represented, but iron portions of artifacts are often lost entirely. On *QAR*, the temperate and turbid waters of the Mid-Atlantic Coast encourage the growth of both concretion products and biological agents of degradation. Wood is susceptible to attack from ship worms (*teredo navalis*), bacteria, and the eroding effects of waves and sand along the banks. Fragments of wood are mostly commonly found in direct association with iron artifacts which have leached into and mineralized the wood. In this climate, concretion products form around an iron artifact, and over time the iron core slowly degrades. However, where actual iron has disappeared, careful conservation can recover the form of the original artifact through epoxy casting methods. For these reasons *QAR* seems to be yielding proportionally more iron tool artifacts than wooden ones.

- To what degree do the artifacts show evidence of singularization? What kinds of social meanings could these tools have carried based on this evidence?

This close analysis of tools revealed no clear evidence of individual personalization in these tools. The fabric wrapping around the gouge bit suggests a certain level of individual valuation of these tools. This protective activity may have been motivated by simple functionality, that the tools work best when they remain very sharp. Tools may also have been protected while in storage because they were of a higher quality than unprotected tools or because these tools were scarce or expensive. Of course, it may simply be that the protective measures were not preserved on other artifacts recovered to date.

Some artifacts recovered from *La Belle* were found with decorative motifs, but no clear evidence of decorative motifs was identified on tools from *QAR* (West 2017:644). The lack of personalization may mean that the recovered tools represent a more general collection of ship's tools rather than a discreet tool kit of an individual craftsperson. However, many of the surfaces on the wrought iron tools are highly degraded, which can obliterate subtle evidence of use wear and personal marks. Tools from other archaeological sites are most often decorated on the wooden handle portions, but for reasons stated above, few wooden tool artifacts are represented on *QAR* thus far. It stands to reason that an individual could find the means to mark or carve a wooden handle themselves, far more readily than an average sailor or carpenter could afford to have tools forged with custom personalization marks included.

Discussion and Limitations

One critical caveat to the preceding analysis is that it is by no means a complete analysis of the tool collection aboard *QAR.* While estimated 400,000 artifacts have been recovered from the wreck site, only a small percentage of the over 4,000 concretions have been fully broken down and the artifacts conserved. So, while the tools analyzed above provide proof positive of some kinds of activity, it certainly does not cover the whole range of work that sailors preformed aboard the ship.

Historical records provide the names of some of the carpenters and other craftspeople from *La Concorde* which were pressed into service under the pirate crew. Master carpenter Espirit Perrin and second carpenter Renè Duval may have made use of the gouges and hammers to shape and repair wooden elements of the ship. Armorer Jean Jacques may have used the vise to hold small parts and pieces of muskets as he filed and shaped them back into working order. Several firearms have been recovered from *QAR*, which is more than might be expected from a low impact wrecking event where they had time to salvage small, portable valuables. It is possible that the guns left behind were damaged or broken, and a study of gun parts in relation to metal working tools might give insight in into weaponry repair activities on board.

There are also a significant number of iron cask hoops represented on site. Two coopers aboard *La Concorde*, including Jean Coupard, died of disease prior to Blackbeard capturing the vessel (Ducoin 2001:28). Other documents provide evidence that an American cooper, Edward Salter was later pressed into service, suggesting that the crew had need for a skilled cooper to maintain and repair provision casks aboard the ship. Originally, many of the tools discussed above were theorized to be related to coopering activities. While some general carpentry tools could be used in cooperage, there is not yet evidence of tools like draw knives and planes, which are critical for building and repairing casks. Because these tools are largely constructed from wood and narrow pieces of metal, they may have degraded significantly after the wrecking and be difficult to recognize. A focused analysis of non-descript iron bars and rectangular fragments may reveal more evidence of cooperage activities aboard.

Conclusion

Queen Anne's Revenge was a large sailing vessel and like all wooden ships it required constant upkeep and maintenance. By the time of the vessel's sinking, the lower portions of the hull were riddled with lead patches used to stem the constant leakage that comes with wooden vessels, suggesting that *QAR* was in need of some major maintenance and repair work (Borrelli 2020). Some historians theorize that Blackbeard's goal was to transit Topsail Inlet and make for his hideout on Ocracoke where he could beach his vessels and do major repairs. Others believe that Blackbeard intentionally ran *QAR* aground and abandoned it to shrink the pirate fleet and lower their profile after blockading a major colonial harbor for nearly a week. Regardless of Teach's intentions, it appears that *QAR* was well equipped to manage vessel repairs and maintenance. Continued conservation efforts may uncover more tools and additional evidence of the types of crafts that were performed on *QAR.* Adding to this body of evidence will provide a fuller picture of shipboard life for mariners of all kinds in the 1700s.

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