HOLY WHAT?:
REINTERPRETING THE JOHN'S ISLAND WRECK
IN EDENTON, NORTH CAROLINA

By

Addison W. Costa

May 2026

Director of Thesis: Jason T. Raupp, Ph.D.

Department of History, Program in Maritime Studies

ABSTRACT

From 1775 to 1783, the Revolutionary War raged across the 13 British North American colonies. To exert greater pressure on the rebellion, the Royal Navy blockaded harbors throughout New England, and British authorities encouraged harassment and raiding of colonial ports. For the purpose of coastal defense, North Carolina and Virgina worked together to construct two galleys: *Washington* and *Caswell*. Both galleys used Edenton, North Carolina, as a home port, and *Caswell* sank there in 1779 due to structural issues. *Washington* was summarily deployed for action and vanished from the historical record in late 1780. Roughly a year after *Washington* left Edenton, a ship-rigged row galley named *General Arnold* attacked the town. Targeting economic infrastructure, *General Arnold* burned plantations and warehouses, stole a merchant sloop, and disabled a local schooner before being seized by the townspeople of Edenton. After its capture, the fate of *General Arnold* is relatively ambiguous. Some stories indicate that it was used as communal property by the merchants of Edenton, while others suggest it was renamed as the privateer galley *Tartar*, reportedly launched at Edenton in 1782 (Babits and Howard 2008:20).

The John's Island Wreck is located at the mouth of Pembroke Creek near Edenton. The site was the subject of archaeological investigations in 1980 and 1993, which resulted in speculation that the remains represent the merchant ship *Holy Heart of Jesus*. Helmed by Swedish captain and gun smuggler William Borritz, that vessel was reported to have unexpectedly arrived at Edenton in 1778 with a cargo of 45 cannon. Though archaeological evidence found in both investigations did not explicitly rule out this interpretation, the vessel's identity was never confirmed. The proposed thesis seeks to reassess the interpretation of the John's Island Wreck by comparing legacy archaeological data with that recorded in 2024, as well as recently available archival data, to determine whether it could be the remains of a row galley dating to the Revolutionary War.

Holy What? Reinterpreting the John's Island Wreck in Edenton, North Carolina

A Thesis

Presented to the Faculty of the Department of History

East Carolina University

In Partial Fulfillment of the Requirement for the Degree

Master of Arts in Maritime Studies

By

Addison W. Costa

May 2026

Director of Thesis: Jason T. Raupp, Ph.D.

Thesis Committee Members:

Jennifer McKinnon, Ph.D.

Eric Oakley, Ph.D.

Lawrence Babits, Ph.D.

Dedication

To my mother, who always pushes me to be the best version of myself. Your endless patience and incredible support made this research possible. Thank you for all you are and all you do; this thesis is dedicated to you.

Acknowledgements

"If I have seen further, it is by standing on the shoulders of giants." ~ Sir Isaac Newton (1676)

A thesis is a massive undertaking, the gravity of which I was wholly unaware of when I started down this endeavor. I am extremely fortunate in that I have had an incredible community of peers and researchers at ECU which has aided me greatly in this project. Additionally, this research would not have been possible without the decades of prior archaeological and historical work done pertaining to Edenton and the John's Island Wreck. Much of this research I see as part of a 'living compendium,' and my hope is that it will continue to be updated as more information becomes available, both archaeological and historical. It is both a privilege and pleasure to participate in the research process.

First and foremost, I want to thank my advisor, Dr. Jason Raupp, who sparked my interest in this project and who lent me his ear as I yammered on about flat bottom watercraft for nearly two years now! I am very grateful for your mentorship, time, tutelage, and assistance.

I also want to thank my committee members, Dr. Jennifer McKinnon, Dr. Eric Oakley, and Dr. Lawrence Babits for their editorial patience and constant support throughout this project.

A huge thank you to the wonderful staff at the Queen Anne's Revenge Conservation Lab, who are currently conserving the material recovered from the John's Island Wreck. Thank you Kim Kenyon, Elise Carroll, Darby Robbins, and Daniel Lowery! Your hard work and dedication are very much appreciated and I greatly enjoyed my volunteer time in the lab.

Thank you to Chris Sabick and the Lake Champlain Maritime Museum who provided me with a plethora of historical information and archaeological data for this project.

Another massive thank you to my family, Mom, Dad, Eli, your support is incredible, and I am so lucky to have such wonderful parents and such a great brother!

I also want to thank my amazing partner, Kyleena, who has always been a champion for me and my various endeavors. Thank you for your patience, support and love.

Last but certainly not least, thank you to everyone in my cohort: Jim, Armani, Ian, Dorian, Nate, Cory, Evan, and Don. Your friendship makes work fun, thanks for all the laughs and great times!

Table of Contents

List of Figures

Chapter 1: Introduction

The Albemarle-Pamlico estuarine system in North Carolina is fed by six major waterways and provides an important ecosystem that supports an abundance of flora and fauna. The coastal regions of North Carolina were first populated by indigenous peoples at least 12,000 years ago (Ward and Davis 1999:2-5). By the 15th century CE the coastal areas were dominated by Algonquin speakers including the Roanoke, Pamlico, Nansemond, and Chowan while inland areas were inhabited by Iroquoian peaking Tuscarora, Meherrin, and Nottoway. Primarily sedentary and agrarian societies, the region's Indigenous groups were steadily displaced by disease and territorial encroachment resulting from European colonization (Salisbury 1996:399-403). It is important to note, however, that those groups did not disappear and some are still active today with tribal affiliations including the Eastern Band of Cherokee Indians, the Haliwa-Saponi Tribe, the Coharie Tribe, the Lumbee Tribe, the Meherrin Tribe, the Occaneechi Band of the Saponi Nation, Sappony, and the Waccamaw Siouan Tribe (NCDOA 2025).

Abundant natural resources in the Albemarle-Pamlico region prompted several frontier trading posts that developed into permanent settlements by the late 17th century (McCusker and Menard 1985:170). Established during that period, the town of Edenton was a central maritime hub for North Carolina exports during the 18th century. Situated at the convergence of Pembrook Creek, Queen Anne's Creek, Chowan River, and Albemarle Sound, Edenton took advantage of both coastal and riverine traffic. The town subsequently evolved into a prosperous port city, enriched by control of vast quantities of material exports from the Albemarle region.

Due to Edenton's rich coastal trading history, it is not surprising that several archaeological sites dating to the 18th century exist in the town and surrounding areas (Neidinger 2000; Goodall 2003; Babits and Howard 2008). Additionally, within Edenton Bay are the

remains of at least two 18th century ships, the John's Island Wreck (EDS0001) (FIGURE 1) and the Burrough's Wreck (EDS0007). As two of only eight known shipwreck sites in North Carolina currently dated to that period, these wrecks provide invaluable insight into the maritime world of Edenton and the state at that time.

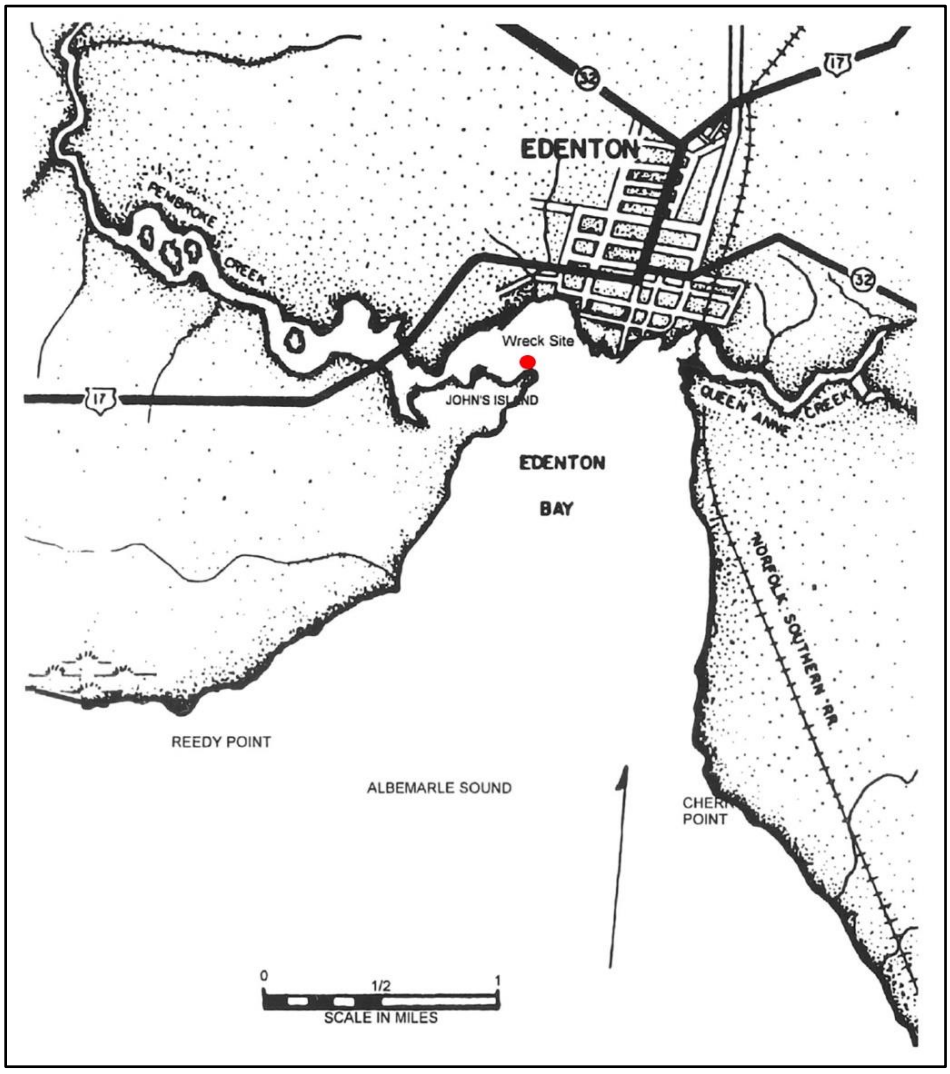

FIGURE 1: Map of Edenton, North Carolina, and surrounding waters; John's Island Wreck site in red (Watts and Lawrence 1980:5).

1.1. Edenton's Revolutionary Vessels

In early summer 1781, a row galley attacked Edenton under the command of Michael Quinn. A curious character, Quinn served in the Continental Army and rose to the rank of

captain in the 8th North Carolinian Continental Regiment in 1777. By 1779, however, morale among many in the American forces slipped after a series of harsh defeats. For his part, Quinn resigned his commission and threw his lot in with the British, possibly acting as a spy to gather intelligence for a raid planned on the Albemarle Sound area of North Carolina (Babits and Howard 2008:14-15). In a letter dated March 1781, British Major General William Phillips, wrote to General Henry Clinton that "a proper person has been dispatched overland to Edentown [*sic*]… to collect intelligence. He may be expected to return in six days." This letter was sent in the context of plans for British military action within the Albemarle Sound and it is possible that this correspondence referred to Quinn (Babits and Howard 2008:18).

While it is unknown if Quinn was the spy referred to by Phillips, two months later Edenton was attacked by the galley *General Arnold*, under his command. The raid resulted in the burning of Edenton's waterfront and the destruction of several vessels, storehouses, and private homes (Lamb 1781; Higginbotham 1976:248). After the attack, Quinn absconded onboard the galley with a large amount of goods, then went to Stumpy-Reach and stole the vessel of Robert Smith (Higginbotham 1976:248). The attack proved a massive financial blow to Edenton's residents, with roughly 80 hogsheads worth of rum and 700 hogsheads worth of tobacco destroyed or stolen (Lamb 1781). Among the vessels burned in the raid was a schooner owned by local merchant William Littlejohn (Lamb 1781; Higginbotham 1976:248).

Within a week of *General Arnold*'s attack along the waterfront, Edenton's merchants financed a revenge expedition. On 29 May 1781, the local force surprised *General Arnold* at anchor in a marsh, captured the vessel, and detained Quinn and 18 others. The rest of the British raiders were either absent, killed, or fled. While in captivity at Halifax, North Carolina, Quinn was killed by two Continental soldiers. Although the fate of *General Arnold* is unknown, several

accounts suggest what became of the vessel. Though one such account states the vessel may have been outfitted as a privateer and renamed *Tartar*, unofficial colloquial accounts suggest it may have been retired to act as a warehouse for communal use by Edenton's townsfolk until it became derelict and was salvaged (Babits and Howard 2008).

A second notable vessel which is tied to Edenton was the galley-ship *Caswell*. *Caswell* and its sibling ship, *Washington*, were constructed in a joint project undertaken by North Carolina and Virginia for mutual defense. Built up the Chowan River in Virginia at South Quay, *Caswell* was registered at Edenton and returned there after patrolling Ocracoke and Currituck inlets. A large galley-ship, it was ultimately abandoned in Edenton or South Quay after rotting at its berth from a combination of shipworm (*Toredo navalis*) infestation and shoddy construction (Jefferson 1779b; Rankhorn 1833).

From the outbreak of the Revolutionary War to its end, Edenton was a prosperous port, shielded from British blockades by the treacherous hydrography of the Carolina sounds. In the years immediately following the war, Edenton prospered, with merchants such as William Borritz and Samuel Dickenson sending vessels throughout the east coast, as well as to Bermuda and England. By the end of the 18th century, economic growth throughout Edenton slowed and the salvage of derelict vessels was common (Rodgers and Corbin 2002:231).

Edenton's prosperity was permanently halted in the late summer of 1795 when two massive hurricanes hit within ten days of one another. The storms destroyed coastal infrastructure and deposited a large amount of silt in Edenton's harbor, proving fatal to the town's commercial growth. Combined with the natural closing of the channels, the harbor became impassible for large vessels. No longer able to dock at Edenton, cargo ships and regional commercial traffic rerouted imports to places like Norfolk, Virginia, and Elizabeth City, North

Carolina. While the town never faced financial ruin and retained its wealth into the 21st century, its growth was permanently stunted. As trade shifted away from its maritime center, multiple vessels were left moored in Edenton harbor. Over time and due to lack of maintenance, many of those vessels deteriorated beyond repair, subsequently being burnt and stripped for iron, a valuable material that could be easily repurposed (Rodgers and Corbin 2002:231).

1.2. Previous Research

The John's Island Wreck was first investigated in 1980 as a part of a larger harbor survey conducted by Gordon Watts and Richard Lawrence with the North Carolina Department of Cultural Resources Underwater Archaeology Unit (UAU) (Watts 1981:14). From the beginning of that project, rumors circulated that the John's Island Wreck represented the remains of the local legendary gun smuggling ship *Holy Heart of Jesus*, captained by Edenton merchant and property owner William Borritz. Onboard that vessel Borritz smuggled 45 cannon into Edenton and South Quay during the height of the Revolutionary War. Borritz remained in Edenton after the cannon delivery; *Holy Heart of Jesus* disappeared, leaving scant evidence of its fate.

The 1980 project team recorded the length for the John's Island Wreck as 31 meters (m) (101 feet [ft]) and noted evidence of burning (Watts 1981:19). Limited excavations conducted along the keel included the retrieval of some loose timbers and several diagnostic artifacts which provided a temporal range to date the remains. Watts and Lawrence created a map of the site and determined that the remains were those of a large, three-masted ship, which offered support for the association with *Holy Heart of Jesus* (FIGURE 2) (Watts 1981).

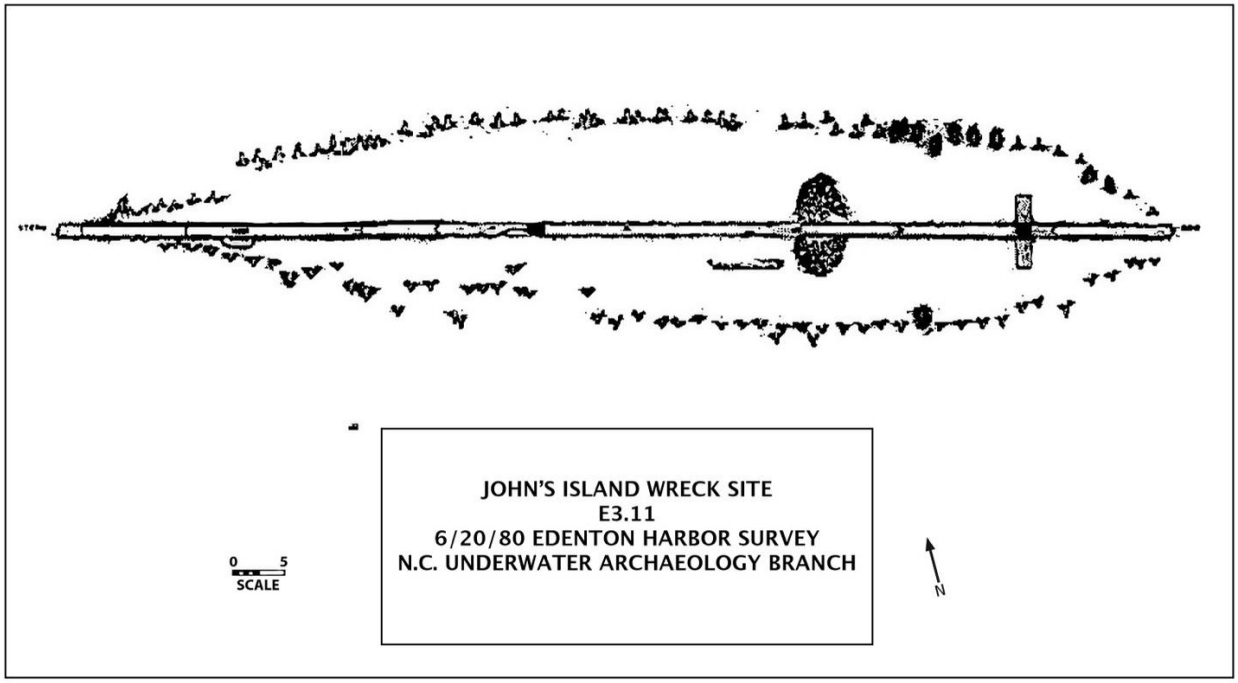

FIGURE 2: John's Island Wreck 1980 site plan (Watts and Lawrence 1980).

In 1993, Dr. Bradley Rogers and Dr. Lawrence Babits investigated the John's Island Wreck for a second time as part of East Carolina University (ECU) Program in Maritime Studies summer field school. That investigation produced an updated site plan for the wreck and included an excavation of the port side remains, as well as the *in situ* recording and recovery of several artifacts associated with the wreck (FIGURE 3) (Neidinger 2000:53). No other identities or ship types were considered for the John's Island Wreck, with the 1993 researcher only investigating its potential connection to *Holy Heart of Jesus* (Neidinger 2000).

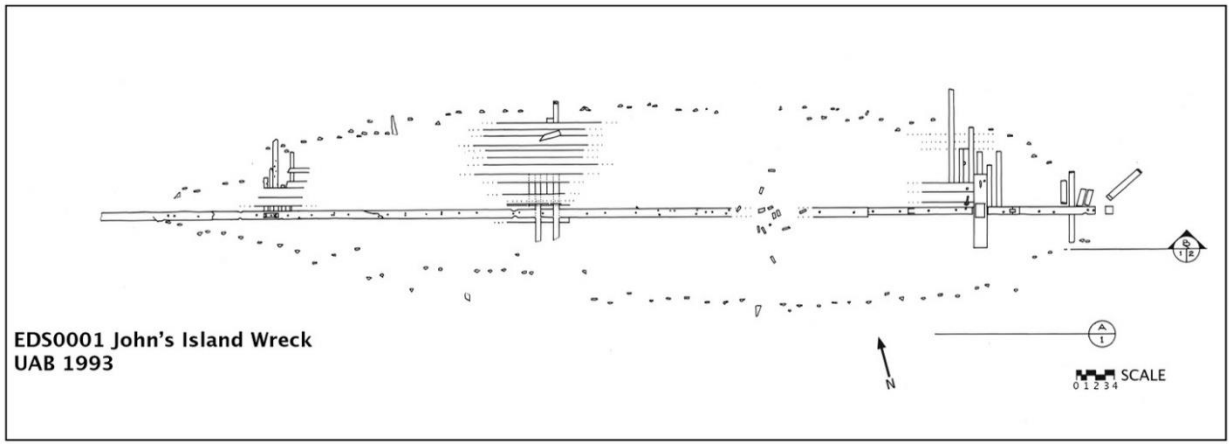

FIGURE 3: John's Island Wreck 1993 site plan (Neidinger 2000:73).

Both the 1980 and 1993 investigations produced data that suggested the John's Island Wreck fit several criteria for *Holy Heart of Jesus.* Although little was known about that historic vessel, Captain Borritz's reference to it being rigged as a 'ship' provided initial support, as the term is specific to a three-masted vessel rigged with square sails (Fowler 1976:188; Lambert 2000:27-28). Since the number of cannon delivered and their weight was known, the minimum size of the vessel was established to be 130 tons (Neidinger 2000:52). Based on data recovered from the site, the John's Island Wreck was estimated to be a vessel of 250 tons of burden, theoretically large enough to carry the cannon shipment. In addition to the length of the wreck and estimated tonnage of the vessel, three mast steps were documented at the site which further suggested it was rigged as a ship. Although only circumstantial parallels were noted between the historical account of *Holy Heart of Jesus* and the remains of the John's Island Wreck, the initial association between the two vessels took root and was long regarded as fact since no other vessel types or historical candidates were seriously considered (Watts and Lawrence 1980:11-12; Neidinger 2000:3).

Although some structural features observed at the John's Island Wreck could have been associated with a cargo ship such as *Holy Heart of Jesus*, the wreck displayed construction

elements inconsistent with typical designs for dedicated North American cargo haulers of the late 18th century. In addition to structural anomalies on the wreck, several other notable maritime incidents occurred in Edenton during the Revolutionary War which were unknown to researchers in 1980 and 1993. The circumstantial historical association of the John's Island Wreck with the story of *Holy Heart of Jesus* prompted the reinvestigation of the site by ECU in 2024. As such, this thesis reconsiders the John's Island Wreck, the history surrounding *Holy Heart of Jesus,* and other Revolutionary War era maritime events which occurred in Edenton, to objectively assess the data and proposed alternatives to the unverified narrative.

1.3. Research Questions

This thesis involves the revaluation of the John's Island Wreck with the primary goal of investigating its historic identity. Although two seasons of archaeological fieldwork were previously undertaken at this site, neither reached a definitive conclusion on the wreck's identity or vessel type. On the basis of the observation of three mast steps recorded at the site, some locals maintain that the remains to be those of the three-masted sailing ship *Holy Heart of Jesus*, a gun smuggling vessel captained by local businessman William Borritz (Neidinger 2000).

In the more than 30 years since the last site investigation, new historical and archaeological data has come to light. With mass digitization of historical records, modern databases offer compelling insight into the history and use of North American-built galleys from the period. Archaeological data related to 18th century galleys has grown considerably since 1993 due to the identification of other wrecks found in Lake Champlain (Emery 2003; Crisman 2014). From the proliferation of data related to the vessel type and the suspected loss of two galleys at Edenton during the Revolutionary War, the identification of the John's Island Wreck as *Holy Heart of Jesus* is questionable.

This thesis research utilized legacy and recently recovered datasets from the John's Island Wreck for a reevaluation of the structural remains. The primary question guiding the thesis asks whether the vessel remains at John's Island Wreck were those of a row galley. To help answer this, several secondary research questions were also considered. Those include:

1. What constitutes a row galley?
2. Were physical characteristics of 18th century row galleys standardized? If so, do the remains recorded at the John's Island Wreck correspond?
3. What wood species were used in the construction of North American-built row galleys? Do the species identified through sampling of the John's Island Wreck correspond?
4. Do artifacts documented at the John's Island Wreck suggest that the vessel was a galley?
5. If the John's Island Wreck is determined to be a row galley, does it represent the remains of *General Arnold*, *Caswell*, or *Washington*?

1.4. Significance

The John's Island Wreck presents an invaluable cultural resource related to the foundation of the United States (US). North Carolina has only eight archaeologically documented shipwrecks dating to the Revolutionary War, one of which is the John's Island Wreck. In addition to its historical significance based on age, the John's Island Wreck may represent the remains of a Continental or State galley, a type of military fighting vessel outfitted by both state navies and the Continental Congress during the Revolutionary War to protect American ports. No Continental galleys from the Revolutionary War period have been thoroughly documented in an archaeological context in North Carolina. The John's Island Wreck is currently the only known example of this vessel type in the American southeast. Furthermore, the John's Island Wreck has experienced significant change due to its depositional environment

since the last archaeological investigation occurred. Based on those changes, it is feared that the site will further deteriorate in the coming decades, thus making diagnostic investigations of utmost importance.

1.5. Thesis Outline

This thesis is composed of five chapters. This introduction is followed by a chapter focusing on the establishment, development, and Revolutionary War history of the town of Edenton. Chapter three reviews history of the row galley as a vessel type through the ages and discusses changes in use, armament, and designs, as well as 18th century developments in European and American contexts. The fourth chapter revises and discusses prior archaeological research conducted at the John's Island Wreck and presents an overview of the latest assessment of the site conducted in May 2024. Chapter five focuses on a comparative analysis of archaeological data between known galley sites and the John's Island Wreck. It also includes a closing discussion of the historical and archaeological data pertaining to the site.

Chapter 2: Revolutionary Maritime Shipping Hub: The Birth, Boom, and Death of Maritime Edenton, North Carolina

Although contemporary accounts of subsistence and production among the 13 British American colonies generally focus on New England, the maritime world of the southeastern colonies is of equal importance. Playing an essential role in the establishment of colonial markets and material exports, ports throughout the South were integral logistics hubs for the resources and consumable goods required at sugar plantations and boatyards throughout the West Indies and Bermuda (Crittenden 1931:145-147; Keith 1948). One such harbor was Edenton, which experienced a full life as a port city, witnessing definitive periods of growth, economic explosion, stagnation, and finally, death due to forces of nature.

2.1. The British American Colonies and Growing Independence

The early days of colonization were marked by subsistence difficulties. A boon for labor, the English Civil War caused waves of migrants to flock to the colonies. New England, in particular, experienced a series of large migrations of displaced people providing them with a surplus population (Salisbury 1985:448-449). Prior to the English Civil War, the British American colonies largely relied upon English supply ships to bring labor, manufactured goods, and resources. The outbreak of war caused a marked shift within the British American colonies, as they became producers and achieved self-sufficiency in both food and resource procurement.

With the British American colonies responsible for resource exports, the import/export economy was fundamentally altered; British America exported increasingly large amounts of material goods and resources throughout the transatlantic world, while only importing non-essential luxury items. Exports diversified in both volume and type throughout the 18th century as colonial America's economy grew to support other satellite colonies of the British Empire (McCusker and Menard 1985:273-278).

While the individual 13 American colonies were largely unified through their British origin, they were fiercely independent in rhetoric, often stemming from differing foundational principles established in the early 17th century. Thus, while the British American colonies did not always get along (or necessarily like each other) their economic diversity naturally encouraged cooperation (McCusker and Menard 1985:35-38). Their mutual support was expressed economically with older ports such as, Gloucester, and Boston, acting as northern hubs for goods to be dispersed south, whereas southeastern ports sent material resources to the northern ports (McCusker and Menard 1985:170-174). This cooperation promoted the development of a rich and diverse economy thriving along the eastern seaboard.

Vast quantities of wood available in North America brought a great boom to the development of the coastal infrastructure throughout the colonies. Large quantities of wood meant cheaper construction prices and consistent, high volume timber exports that allowed new businesses and homes to expand at lower costs. By 1670, the New England fur trade was dwindling due to prolific overhunting, nearing complete collapse by 1675 (McCusker and Menard 1985:94; Bilodeau 2013:15-16). To offset the loss of this northern industry, a new production type arose to close the economic gap: coastal shipbuilding. The shipbuilding industry provided a boost to coastal interaction throughout the colonies. Northeastern ship construction, originally intended for local fisheries, developed to further encompass transatlantic needs. The shipbuilding industry grew thanks to increased demand for colonial produced goods and commodities which provided the funding to construct large ships in increasing numbers (McCusker and Menard 1985:97-99).

Greater numbers of ships meant that more goods could be moved and ensured greater profits, thus allowing for consistent growth throughout colonial America. Due to local sourcing

of materials, vessels built in New England were cheaper than their European counterparts and increased in popularity among both colonial traders and British merchants alike (Walton 1968; Goldenberg 1976). Prolific domestic shipbuilding industries enabled the formation of an incredibly diverse maritime trade network which acted as an important supply line for the British colonies throughout the West Indies (Walton 1968; McCusker and Menard 1985:98).

Rich coastal interaction was further boosted by a mix of Indigenous and European hunters and trappers spreading along the eastern coast and into the interior of the American South, in pursuit of animals for food and pelts (Dunaway 1994). With game hunted out of New England, waterways were used to traverse and expand inland in pursuit of furs throughout the eastern seaboard allowing colonists to reach into previously untouched areas. North Carolina pelts were shipped out along the same waterways to the coast where they arrived at early ports such as Edenton or Beaufort, North Carolina (Dunaway 1994:217, 230). Furs were then loaded onto vessels and exported north through the Chesapeake or overseas to European markets. Abundance of white-tailed deer, racoon, beaver, and river otter brought fur traders to what is now North and South Carolina. This increased demand for furs devastated local otter populations and at the same time provided a firm economic platform to expand settlements (Sumner et al. 2018).

2.2. The Establishment of the Carolinas and Edenton

New England's economic success was especially important to the growth of southern colonies like that of Virginia, and later, North Carolina. Extraction based industries dominated colonial America and were responsible for the expansion of commerce into the southeastern region of North America. With growing industry and population, by the 1640s many European migrants dispersed to interior areas along the fringes of the colonies (Shepherd and Williamson

1972:171-173; Salisbury 1985). Homesteading on the frontier(s) provided settlers with large plots of land. A vestige from medieval England, land ownership was a measure of wealth and early waves of Europeans endeavored to replicate a system of feudal values (Salisbury 1985:449).

Effectively a "colony of a colony," the area that later became North Carolina was established by displaced settlers expanding throughout the Chowan River basin during the late 1640s. In the 17th century both North and South Carolina were originally called "The Province of Carolana" in the original charter granted to Sir Robert Heath by King Charles I in 1629 (Powell 1958:16). However, in 1663, King Charles II voided the 1629 charter and granted eight Lords Proprietors the territory that eventually became North and South Carolina (Horne 1666). Following similar establishment patterns as the New England colonies, the Carolinas were settled by Europeans first in the coastal areas, who then expanded inland using natural waterways to travel. By the late 17th century, the Albemarle area was known as "the County of Albemarle" (Homann 1715).

The town that eventually became Edenton was established in the late 1650s by people from the Virginia colony. The physical site was first called "the Towne on Queen Anne's Creek" in 1712. The town's name changed as it grew over time, later being referred to as "Ye Towne on Mattercommack Creek," then the "Port of Roanoke." It was officially named "Edenton" in 1722, after the late governor, Charles Eden, upon the formal partition of the North and South Carolina colonies (Stick and Hairr 2006; Lawrence et al. 2015).

2.3. Edenton: Shipping Hub

Despite the outer banks of North Carolina being notoriously treacherous for large ships, Edenton was a thriving commercial shipping hub in the 18th century. Serving as a midway point

between New England and the West Indies, Edenton saw a wide variety of ships, people, and goods flow throughout the transatlantic triangle trade. Edenton's early economic success at the dawn of the 18th century was further assisted by the establishment of shipbuilding industries along the eastern seaboard. Abundance of natural resources in British America helped supply the increasing demand for shipbuilding timber both domestically and in England, where the country suffered from deforestation and the Crown required outsourced timber (Melby 2012:5-7).

To boost productivity in the timber industry within British America, the British Parliament passed a law in 1705 which required the Royal Navy to pay a higher tax to colonial American merchants for all naval stores (Williams 1935:169-170; Walbert 2006). Naval stores was a term for items essential for building and maintaining ships and included pitch, tar, timber, turpentine, rosin, hemp, and linens. With colonial merchants aided by Parliamentary legislation, timber extraction grew to encompass a large and critical component of Edenton's early economy and remained incredibly profitable throughout the late 1760s (Walbert 2006).

Situated along Albemarle Sound at the mouth of the Chowan River, Edenton was perfectly located to capitalize on both transatlantic and domestic riverine traffic. In addition to being a mouth to the sea, the Chowan River flows through North Carolina coast from Virginia. Among the early towns along the Chowan riverfront in Virginia was South Quay, home to an active and bustling colonial population. South Quay had a thriving agricultural economy as well as an international customs shipping house and modest shipbuilding yard. In the early 18th century, vessels journeyed through Albemarle Sound and docked in Edenton, before either continuing up the Chowan to South Quay or offloading and resupplying with new cargo bound for either New England, Britain, or the West Indies (Parker 1975:170-172). Edenton's geography gave the town the advantage of picking up virtually all transatlantic traffic in and out of South

Quay, which further boosted its local economy. Reciprocal trading benefited both South Quay and Edenton and the importance of the preindustrial economic relationship between the two towns cannot be understated (Parker 1975:65-68).

In addition to geographic location, early economic activity at Edenton can also be attributed to the fact that it was North Carolina's first colonial capital. In 1746, Edenton's port records showed trans-shipping and exports of household consumable items such as rum, sugar, salt, shot, saddlery, and gunpowder (NCOSA 2024:2564). Apart from gunpowder, sugar, and salt, all other goods may have been manufactured locally (Stephenson 1925:271-273; McCusker and Menard 1985:180-182). Because Edenton was the original state capital, the town experienced a large amount of traffic, both mercantile and administrative. Despite the state capital officially moving to Brunswick Town in 1754, colonial port records (far from complete) indicate Edenton experienced an increase in town exports during the mid-1750s that mostly consisted of agricultural goods and naval stores (NCOSA 2024:1946-2042). Consistent exports gave the town a sturdy source of income that persisted well beyond its early state administrative days. Edenton remained an extremely active port throughout the remainder of the 18th century (Neidinger 2000:27-28).

During the late 1750s, Edenton experienced the birth of two manufacturing businesses: glass bottle blowing and cooperage. Edenton also boasted a rich agricultural backbone, exporting both tobacco and corn (NCOSA 2024:1946-2042). Situated as a last stop destination for a wide variety of North Carolina goods bound for export, the town was further advantaged through shipping various timber and agricultural products originating from industries throughout the colony.

Despite a relatively diverse range of initial commodities, Edenton focused on exporting massive amounts of naval stores by the mid-1750s. Naval stores made up a sizeable domestic industry as they were produced in large quantities throughout North Carolina thanks to its numerous indigenous pine species. Pine wood contained a high resin content and was great for procuring tar, turpentine, and pitch, all essential materials for ship construction and maintenance. While the naval store industry grew in North Carolina, it began to support and supply overseas shipbuilding yards. As the economies of British America grew, Edenton became a vital port for vessels and goods bound for New England and Bermuda (NCOSA 2024:1951-1953, 1962, 1976).

Household consumable items and construction resources were not the only exports coming out of Edenton, as it also supported domestic trade with the American colonies in the form of food exports. As seen in the shipping manifest of the sloop *Betsey and Sally*, captained by John Savells, exports included food stocks and naval stores. The sloop carried beef and pork from Edenton to Baltimore, Maryland, which were likely intended as provisions for ships newly launched from harbors in Maryland or destined to be sent further north for New England's harbors (NCOSA 2024:1982).

2.3.1. Beginning of the Boom

Colonial port logs for Edenton indicated an increased number of exports of naval stores to both New England and Bermuda starting in 1755 (NCOSA 2024: 2574, 2577-2578, 2581). Bermuda supported a thriving ship building industry throughout the 1750s (Jarvis 1992). As such, North Carolina became successful in naval store production and took advantage of the relative proximity of Bermuda, situated a little over 730 nautical miles from the North Carolina coast. Given the approximate average speed of six nautical miles per hour for 18th century cargo

vessels, a round trip from Edenton to Bermuda was an estimated 10 to 12 days (RMG 2024). Thus, the ability for a merchant trader to make a profit in a short time with fairly minimal risk was incredibly advantageous. With this established trade route Edenton became a primary supplier of timber and naval stores for the Bermuda shipbuilding industry (NCSOA 2023:2577-2578).

From 1755 to the late 1760s, Edenton, was an important partner in the southeastern Atlantic network. As the colonies thrived, however, attitudes soured towards Britain. Multiple disagreements over taxation and trade regulation steadily contributed to the discontent on the part of the 13 British American colonies. Attempts by the British Parliament to reign in imperial expenditures and quell rebellious sentiments by the British Parliament resulted in the passage of punitive legislative acts perceived to be increasingly tyrannical by British American colonists. Despite rising tensions, Edenton remained a highly active port, ironically due in large part to political tensions acting to drive away trade from those in New England (Preston 1996; Neidinger 2000; Yellin 2004).

As Edenton's participation in the Bermudian and West Indies trade defined much of NC's mid-18th century maritime world, it experienced a shipping boom throughout the early 1770s. Between 1771 and 1776, Edenton's harbor was visited by 828 ships a traffic frequency that equates to roughly one ship every two days for five years (Yellin 2004:3-4). The vast boom in maritime activity occurred due to several factors tied to British Parliamentary Legislation of the early 1760s.

2.4. Revolutionary Edenton

Several Parliamentary acts served to spark colonial fury, including the Sugar Act of 1764 and Stamp Act of 1765 (4 Geo. 3. C. 15; 5 Geo. 3. C. 12). While colonial efforts to persuade

Parliament to repeal the acts were successful by 1766, that success was largely viewed as a British embarrassment. To save face, Parliament responded in 1767 with the Townshend Acts, which placed a heavy tax on glass, lead, tea, paint, and paper, among other luxury items imported into the American colonies (Townshend Acts 7 Geo. 3. c. 41, 7 Geo. 3. c. 46, 7 Geo. 3. c. 56). Colonial response was one of fury and many British merchants were harassed by colonial port authorities throughout New England.

In response to provocations, the British Parliament dispatched two army regiments to Boston, Massachusetts, in October 1768. With the occupation of Boston, tensions rose, and riots broke out in adjacent colonies in protest of British actions. As the Crown attempted to force the colonies into submission, British authorities sought to consolidate the resources deemed essential for operation of the Royal Navy. Specifically British authorities sought consolidation of control over pine forested regions such as those in New Hampshire. The British Parliament went about reenforcing old legislation passed decades prior designed to economically pressure colonial production centers. The reinforcement of those laws after decades of lapse led to several localized flashpoints throughout the northern colonies. One such example was in New Hampshire, where an old law dating to 1722 was reimplemented. Functionally, this law made it illegal for colonists to cut white-pine trees without a license from the king (Little 1888:185). Enforcement of the law resulted in royal sheriffs marking logs throughout privately owned colonial sawmills as royal property. By the early 1770s, enforcement of the law had become problematic and highly unpopular as the law made it illegal for colonial landowners to clear their land for personal use (Little 1888:186-187). In 1772, tensions culminated in New Hampshire which resulted in the pine tree riot, where a royal sheriff was nearly beaten to death by a mob of

colonial sawmill owners. This heightened tension in New England drove trade to the calmer, southern ports (Little 1888:189-191; Millar 1978:6).

By the 1770s, colonial America produced consumable materials and resources upon which England became increasingly dependent. With England reliant on colonial production, Parliament's punitive legislation was confined to targeting imports and resulted in heavy taxes levied on imported luxury items, including tea. While the Townshend Act of 1767 established firm taxes and controls around the importation and sale of tea, the Tea Act of 1773 served to add insult to injury. As tea was an important status symbol of the 18th century, it was the primary beverage among the wealthy circles of the British American colonies. By extension, tea was also one of the most expensive commodities of the 18th century and represented a large and lucrative market. Although the Tea Act did not explicitly add additional taxes to the import of tea, it legally monopolized the sale and trade of tea for the British East India Trading Company (EIC), allowing it to sell tea directly to colonists as opposed to going through licensed colonial middle-merchants. This direct trade resulted in the loss of great revenue for colonial merchants, causing attitudes to further sour (13 Geo. 3. c. 44; Mahoney 2007:5).

Anti-British sentiment from legislative disagreements were not confined to the northern colonies of New England. As Edenton was a cultural appendage of New England, attitudes towards British legislation soured alongside the northern colonies in response to the Tea Act of 1773. In an act of solidarity, on October 25th of 1774, 51 of the town's women banded together in a formal protest, organized by Mrs. Penelope Barker. In this protest, all participants signed their names on a petition stating their intention to boycott all British goods and refused to comply with British regulations and fees around general trade. This petition was published in the October 1774 edition of *The Virginia Gazette* (Rind 1774). Referred to as the Edenton Tea Party, the

pledge of these wealthy households to stop purchasing goods imported from England undoubtedly had a pronounced and immediate economic impact on the local British importers supplying Edenton. Because the residents of Edenton refused to enforce British taxes and terms regarding trade regulation, many colonial importers found their way to Edenton's harbor to avoid British representatives posted at northern ports (Neidinger 2000:26; Mitchell 2015:59-60). The Edenton tea party reflected the waves of anti-crown sentiment echoing through the colonies. When news of the Edenton Tea Party reached England, it was widely publicized (Mitchell 2015:55). British newspapers mocked the women of Edenton to save face, but the widespread publicity proved to be instrumental in understanding American colonial sentiments towards the crown (Mitchell 2015).

Outraged at consistent colonial opposition, British Parliament passed a series of reciprocal acts, now referred to as the 'Intolerable Acts,' designed to force the American colonies into submission. Among the punitive Parliamentary legislation of 1774, the most notable was the Boston Port Act (1774), which closed Boston harbor and froze all commerce from the bay. With an economy that relied almost exclusively on exports, the blockade of Boston could have been extremely detrimental. As tensions steadily rose over the preceding six years in New England, however, sufficient time was given for trade routes to redirect to other colonial ports. Colonial traders at that time sought ports that refused to enforce British trade regulations, resulting in an unprecedented spike in maritime commerce at Edenton (Preston 1996; Neidinger 2000; Yellin 2004).

When formal militarized conflict broke out in April of 1775, the British Parliament passed a "seize and detain" order that targeted all North American ships exporting colonial goods (15 Geo. 3. c. 10). For the first two years of the conflict, colonial American imports and exports

were brought to a halt as Britain sought to economically choke the American colonies back into submission (Preston 1996). As Boston was fully occupied by April 1775 and all trade barred by the end of the year, North Carolina ports such as Beaufort and Edenton saw large boosts in imports through the end of the year. Port Beaufort received multiple shipments of large quantities of rum. The high volume involved was possibly indicative of rerouted vessels originally bound for Boston or other large ports in New England that were faced with the British blockade (NCOSA 2024:3572-3590, 3593-3602).

2.4.1. End of the British Blockade

By 1777, Britain's attempts at choking the economy of the American colonies were effective and all official transatlantic exports out of Edenton halted. Colonial shipping manifests from North Carolina between 1776 and 1777 show the impact of the British blockade. For instance, only one port record was documented in 1777 from Port Beaufort (NCOSA 2024:5090). With the dawn of 1778, however, port records showed a sharp increase in traffic due to the French entry in the Revolutionary War. For the next four and a half years, the French fleet was the bane of the English blockade. French vessels caused chaos throughout the British controlled West Indies, and the Crown was forced to divert a significant portion of its blockade fleet to the southern Atlantic, which allowed holes to form throughout the eastern seaboard (Preston 1996).

With Britain forced to disperse its naval strength throughout the Americas, the effectiveness of the blockade of the colonies quickly deteriorated. Despite attempts to consolidate their efforts, British naval forces were ordered to concentrate around New England, as those ports made for some of the largest colonial exports (Shepard and Williamson 1972). Having most British naval forces concentrated in New England and the West Indies, southern

colonial ports once again were opened for use. Throughout the revolution, Edenton remained a rather secluded port save for two incidents which had large impacts on its future development.

2.4.2. Edenton in the American Revolution

During the American Revolution, Edenton experienced several noteworthy events. Shortly after the outbreak of war, the colonies of North Carolina and Virginia worked together for joint defense against the British. Two war galleys were constructed by Virginia at the Old South Quay shipyard up the Chowan River for the purpose of patrolling the Ocracoke inlet and surrounding sounds from British incursion into North Carolina. These two vessels were dubbed *Caswell* and *Washington.* The first of the two vessels, *Caswell* was completed in late 1776 and captained by a man named Willis Wilson (Wilson 1843). By early 1777, *Caswell* was at its station patrolling the Ocracoke inlet, using Edenton as its home port where it resupplied (Sanchez-Saavedra 1978:156-157). Though both *Caswell* and *Washington* were originally planned to be a joint venture between the two states, Virginia governor Patrick Henry felt that Virginia had put forth more than its fair share of resources toward the outfitting and maintaining of these two vessels and requested 'considerable reimbursement' for the great expenses the state incurred from servicing them (Henry 1779).

Due to disagreements over which state should bear the brunt of the cost of repairs for the vessels, *Caswell* was not consistently serviced. By June 1779, the vessel was reportedly in need of serious repairs. And since Virginia was unwilling to pay for them, officials petitioned North Carolina Governor Caswell to purchase both *Caswell* and *Washington* (Jefferson 1779a). *Caswell* was regarded as leaky and poorly built due to its rushed construction with green, unseasoned wood. It eventually ended up rotting and sinking at its station (Edenton) in mid-June 1779 with Thomas Jefferson confirming the fate of the vessel: "I learn that the *Caswell* Galley is

sunk at her station, that her bottom is eaten out, and her original form such that she could not be hove down to be refitted" (Jefferson 1779b). Although attested to have sank in Edenton, there is ambiguity in what happened to *Caswell*. A petition submitted in 1833 states that after *Caswell* was no longer serviceable, its arms and crew were transferred to *Washington* before being laid up at either Old South Quay shipyard or the John's Island Marsh in Edenton (Bond 1779; Rankhorn 1833).

In addition to being the home port of the galley *Caswell*, Edenton experienced a most curious case of logistical confusion. In 1778, influential colonial Americans Benjamin Franklin, Silas Deane, and Arthur Lee, drafted a contract with Spanish mercantile foundry and firm, Ray and Brandenbourg. That contract called for the delivery of 180 cannon across multiple shipments containing 6-, 12-, 18-, and 24-pounder guns for use by the rebelling colonies in defense of British aggression (Neidinger 2000:33). One of these shipments was delivered by William Borritz, a European born captain who cut his teeth on European waters, from the Mediterranean to the Wadden Sea. Borritz was contracted to deliver 45 cannon to Boston, Philadelphia, New London, Connecticut or Portsmouth, Virginia. In a twist of fate, British blockade efforts remained concentrated around New England, the Delaware and Chesapeake, with the intent of stifling colonial trade out of their major export locations (Millar 1978; Preston 1996).

To avoid British naval vessels, Borritz opted to deliver the cargo to Edenton, where he arrived in mid-July of 1778 on the vessel *Holy Heart of Jesus* (Neidinger 2000:37). Borritz may have chosen Edenton due to its ease of access to South Quay. It is also possible that Borritz knew he could safely harbor in Edenton with the cannon, as his name appears on a 1777 affidavit on which he swore loyalty to North Carolina as a Justice of the Peace (NCSA 1777). Whatever

Borritz's reasons, the result was an unplanned but received shipment of 45 cannon that North Carolina was in no position to afford.

After repeated attempts by North Carolina legislators appealing to Virginia to accept half the cannon shipment, Virginia port authorities accepted and Borritz then offloaded 24 cannon at Edenton before continuing up the Chowan River to unload the other 21 at South Quay (Neidinger 2000). Although successful delivery of the cannon was accomplished by Borritz, he was not paid back in full until 1784 (NCS 1780; Parramore 1967; Neidinger 2000:49). In all, Borritz's cannon ordeal took over five years.

Beyond building up a prosperous merchant business in Edenton, William Borritz also partook in the town's defense against the British in what was Edenton's second dramatic incident of the Revolutionary War (Parramore 1967:37; Neidinger 2000:49; Babits and Howard 2008:14). In 1781, British naval forces patrolled the Albemarle and Pamlico Sounds to quell colonial smuggling. Due to North Carolina's complex and ever-changing sounds, Edenton was largely protected from British warships and thus became a haven for smugglers during the Revolutionary War (Babits and Howard 2008:18). Edenton's smuggling activity eventually caught the attention of the British Admiralty, who planned to raid the town.

Emboldened by the capture of Wilmington at the hands of British Major James Craig in January 1781, Loyalist groups throughout the Carolina and Virginia regions began carrying out widespread raiding attacks on Continental ships and settlements (Dixon 1781). In the early summer of that year, a loyalist ship-rigged row galley named *General Arnold* was burning colonial vessels and raiding Virginia settlements along the Chowan River (Lamb 1781). *General Arnold* was captained by a man named Michael Quinn, an ex-Continental Army officer who had thrown in with the British sometime after 1779 (Babits and Howard 2008:16).

Quinn and his galley attacked the town of Edenton in late May 1781. Arriving by surprise, Quinn and his crew were able to wreak havoc on Edenton. Town Justice and signer of the Declaration of Independence James Iredell reported that Quinn's attack ruined the livelihood of at least one local merchantmen, William Littlejohn, whose vessel was set alight by the raiders (Higginbotham 1976: 251-252; Babits and Howard 2008:18). The raid resulted in the burning of Edenton's waterfront including several vessels, storehouses, and private homes (Lamb 1781; Drane 1908). After damaging the waterfront area, Quinn and his galley absconded with a small schooner belonging to Robert Smith and a large amount of looted goods (Babits and Howard 2008:18-19). Dealing a massive financial blow to the town's residents, the attack saw roughly 80 hogsheads of rum and 700 hogsheads worth tobacco destroyed or stolen in addition to property damage (Lamb 1781; Parramore 1967).

Within a week of Quinn's attack on the town, the residents of Edenton organized a small flotilla to find and eliminate the raiders in an act of retribution for the destruction and raiding of their town and exports. The Edenton force was enabled through the donations of 15 local merchants, including William Borritz, who offered up one of his boats, which may have been his small schooner, *John* (NCOSA 2024:4984, 5038, 5058). Quinn and his raiders sought refuge in the marsh where his galley could anchor safely out of reach from deep drafted military frigates. Between 29 May and 6 June 1781, Quinn, and his crew were located by the mosquito fleet. Catching the raiders by surprise, a short engagement ensued which resulted in their surrender (Babits and Howard 2008:19-20).

A total of 18 prisoners were returned to Edenton in irons. Ten prisoners were captured on the stolen schooner of Robert Smith while the remaining eight, including Quinn, were taken on *General Arnold.* Because it was a ship-rigged row galley, *General Arnold* required a crew larger

than eight people to successfully operate as a raiding vessel. It is unknown what happened to the rest of Quinn's crew; though unsupported by documentary evidence, it is possible they were killed in a skirmish when the townsfolk surprised the anchored galley. A 1781 receipt of the merchants' expenses includes 12 pounds of musket balls and an additional 14 pounds of swivel balls, evidence that indicated the Edenton merchants set out with at least some lethal force (Babits and Howard 2008:20). It is also possible that the remaining raiding raiders fled into the marsh, as was the case with the who stole Robert Smith's schooner (Babits and Howard 2008:18-20). Quinn and the captured raiders were imprisoned and later transported to Halifax. While imprisoned, Quinn was murdered by two continental soldiers who never faced punishment. The captured galley, *General Arnold*, was reportedly later used communally by the town (Babits and Howard 2008:20).

At the end of the Revolutionary War, the United States formed as an independent country and business resumed as normal in Edenton. William Borritz established and maintained a highly profitable export company. While still exporting tar, turpentine, and other naval stores, vessels owned by Borritz and Company made trips to Bermuda to trade iron, sugar, coffee, and rum. Those goods were a wise choice to trade as they fetched a good price most anywhere in the 1780s, and their shipment enabled the war-weary Edenton to rebuild its coffers (NCOSA 2024:5038-5039).

In 1786, another Borritz ship, *Queen of France*, made at least one voyage to Bristol, England, where it carried a large cargo of 20,000 pantiles (roof tiles) for sale (NCOSA 2024:7415). Simultaneous with the transatlantic voyages, Borritz's company also took multiple domestic voyages to and from Baltimore in the years following the Revolutionary War, moving barrel staves, iron shot, and gunpowder. Neither iron shot nor gunpowder was produced at

Edenton, potentially lending credit to the rumors of the town's facilitation of arms smuggling throughout the Revolutionary War (NCOSA 2024).

Edenton's heyday as a shipping center ceased at the end of the 18th century. It might have remained a profitable port town and grown in population and infrastructure throughout the 19th century; however, devastating weather events gutted the town's industry. In a span of 10 days in late July and early August of 1795, North Carolina was hit with two back-to-back hurricanes, now referred to as the Twin Hurricanes of 1795 (Roth and Cobb 2001). Extreme weather from these events was seen as far north as Maryland, with Annapolis silversmith William Faris noting that winds were so strong, ships were blown out of the water and onto the shore (Faris 1794). With such strong forces felt in Maryland, the impact of the two storms in Edenton was undoubtedly catastrophic.

Although the town was spared outright destruction, massive amounts of sediment were deposited in the sounds and closed off Currituck, Roanoke, and old Hatteras inlets. Edenton's harbor bottom became so silted by the two storms, that large, deep drafted ships were unable to dock there (Medlin 2023). This extreme weather event was an immense loss for the town as it destroyed its ability to participate directly in the transatlantic trade. The final nail in the coffin for Edenton's growth was a series of early 19th century canal projects which culminated in the draining of the Dismal Swamp and opening a series of new passageways which further routed maritime traffic away from Edenton (Neidiger 2000:36-37). Instead of bountiful shipping voyages, Edenton was forced to rely upon domestic coastal and terrestrial trade which ultimately crippled its maritime industry (Neidinger 2000:27-28).

2.5. Conclusion

Since the late 17th century Edenton has played a key role in the maritime development of the Carolinas. It acted as an important export hub throughout the first half of the 18th century and grew into a respectable port city by the second half. In addition to the facilitation of resources and material exports, it was home to several industries which further boosted the town's economy. As tensions with Great Britain mounted in the late 18th century and war broke out, Edenton witnessed several notable events stemming from the conflict. The town played a pivotal role in facilitating smuggling for the Continental war effort, with illicit arms trafficking culminating in 1779 through the delivery of over 20 cannon. The town's rebellious ways caught the ire of the British Navy and in the early summer of 1781 it was attacked by a loyalist privateer named Michael Quinn.

With a Continental victory in the Revolutionary War, Edenton enjoyed several years of prosperous growth until the mid-1790s when coastal regions of the Carolinas were hit by two large hurricanes within 10 days of one another. Combined with the natural silting of Ocracoke Sound, those storms helped close the most direct route to Edenton from the Atlantic Ocean, which in turn caused maritime traffic to route around Edenton to other port towns along the Carolina coast. Throughout its life, Edenton played a key role in the development of the Carolina coastal region and subsequently the development of North Carolina as a state. It provided a crucial hub which allowed goods and materials to flow north and south between the Chesapeake Bay area and Charleston, South Carolina, ensuring that the surrounding regions were able to grow largely unimpeded by geographic or hydrographic restrictions.

Chapter 3: The Row Galley Through the Ages

Through the millennia, a wide variety of watercraft were developed across the world, each designed to complement a specific trade or task (Hewett 2022). In the Mediterranean, robust trade routes developed between ancient ports and the need to protect shipments resulted in the western world's first 'jack of all trades' ships: the galley. This vessel type became a defining characteristic of Mediterranean seafaring, being so effective that it ultimately outlasted the civilizations which created it. Over approximately four thousand years, as the galley underwent a variety of modifications and changes, it remained a staple vessel used in maritime trade and conflict through the early 19th century.

As a vessel type, the term "galley" represents a broad range of craft. Galleys were versatile and the term itself is better understood as a family or umbrella under which a wide variety of more specialized vessels fall. Galleys are characterized as watercraft with flat bottomed hulls, shallow deadrise and low freeboard (or, shoal-draft) (Chapelle 1951:31-32), that could be propelled either by sweeps (oars), sails, or a combination of the two (Chapelle 1967:34). The first known galley type vessel dates to the third millennium BCE in Egypt (Wachsmann 1995:10). These vessels were used primarily for trade and transportation of personnel and equipment in riverine and coastal environments.

The dual need of traversing oceanic and riverine conditions directly contributed to the galley's shallow draft design and the early implementation of a single mast fitted with a square-rigged sail (Emanuele 1977:181). Profitable trade throughout the ancient Mediterranean enabled widespread commerce; as trade networks expanded in both reach and volume, the galley proliferated in use (Wachsmann 1995:10). An early 15th century BCE rendition of Queen Hatshepsut's expedition to Punt survives in her mortuary sanctuary at *Dier-el-Bahri* that prominently depicts vessels with a single mast and a square rig (FIGURE 4). One of the earliest

texts discussing oceanic galley combat comes from the 13th BCE Mycenaean civilization in which chroniclers detailed coastal patrols defending against oceanic invaders (Ventris and Chadwick 1973:183).

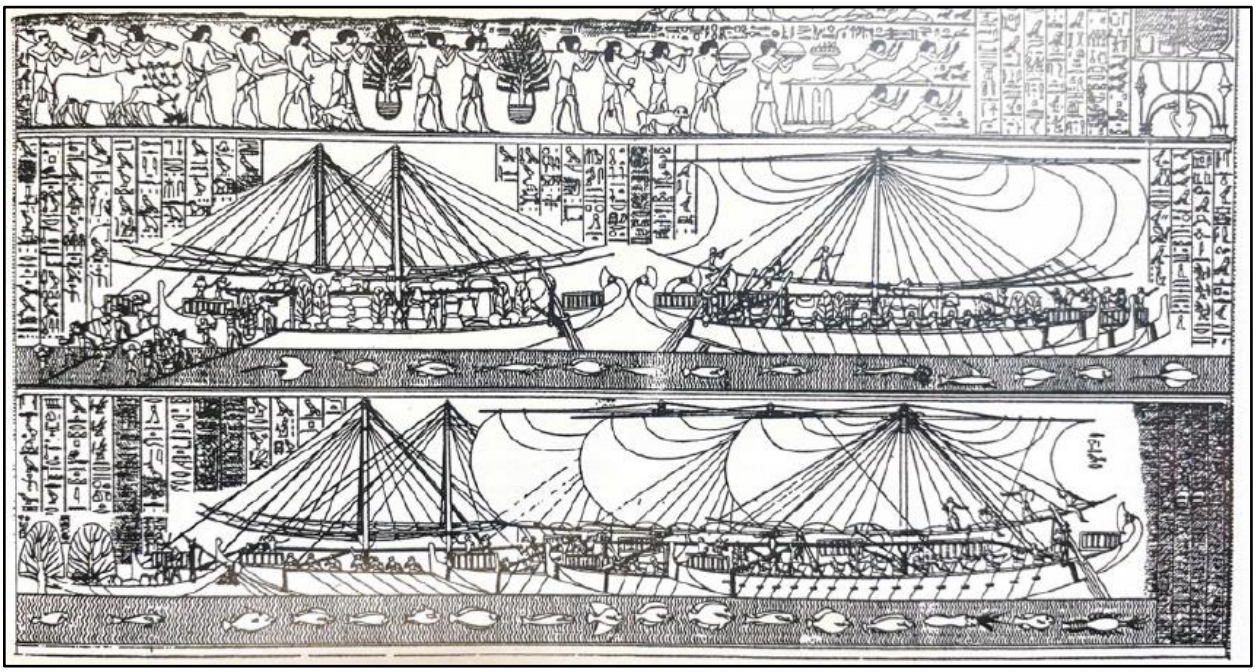

FIGURE 4: 15th century BCE Egyptian galleys of Queen Hatshepsut (Wachsmann 1995:21).

3.1. Galleys of the Ancient World

Galleys constructed throughout the ancient Mediterranean underwent several phases of development over the millennia. As the volume of trade increased, the galley experienced consistently greater variety in design and application. In the Greek world, these vessels were broadly characterized by the number of decks and rowers: monoremes (one), biremes (two), and triremes (three). The earliest Mediterranean galleys were monoremes, reflecting vessels with a single deck of oars, increasing in size and complexity through time (Wallinga 1995:36). Although galley designs and uses are ancient, due to the 12th century collapse of the Near East regional system of civilization and the lack of documentary sources surviving from that period, there is an absence of evidence in favor of a hypothetical continuity in nautical

technology (Wallinga 1995:37). Thus, this broad overview is restricted to a discussion originating with the galleys of the Greek world in the 8th century BCE.

Though fully capable of combat deployment, galleys built during the early 8th century BCE were not quite constructed as dedicated warships akin to vessels built at the end of century and after (Wallinga 1995:39). The early 8th century was a time in which the distinction between commercial and military use was blurred; thus, most vessels had some degree of defensive capability, regardless of primary use (Murray 1919:10, 311, 344). The most common monoreme vessels from the 8th century BCE were referred to as *eikosoros* and *trikontoros*, and by the mid-8th century, the *pentekontoros*. Their names referred to the number of rowers propelling the ship: 20, 30, and 50, respectively. The eikosoros and trikontoros type vessels were lighter, consisting of two rows of 10 and two rows of 15 rowers. Broadly referred to as merchant vessels, they served both civilian and military tasks and were modified over time (Wallinga 1995:36, 39-40). By the end of the 8th century BCE, merchant and military galley classes were established, with military galleys constructed to longer and narrower specifications than their civilian transport counterparts. Military naval galleys were defined by their naval ram, a feature absent on civilian transport galleys (FIGURE 5) (Wallinga 1995:42-43).

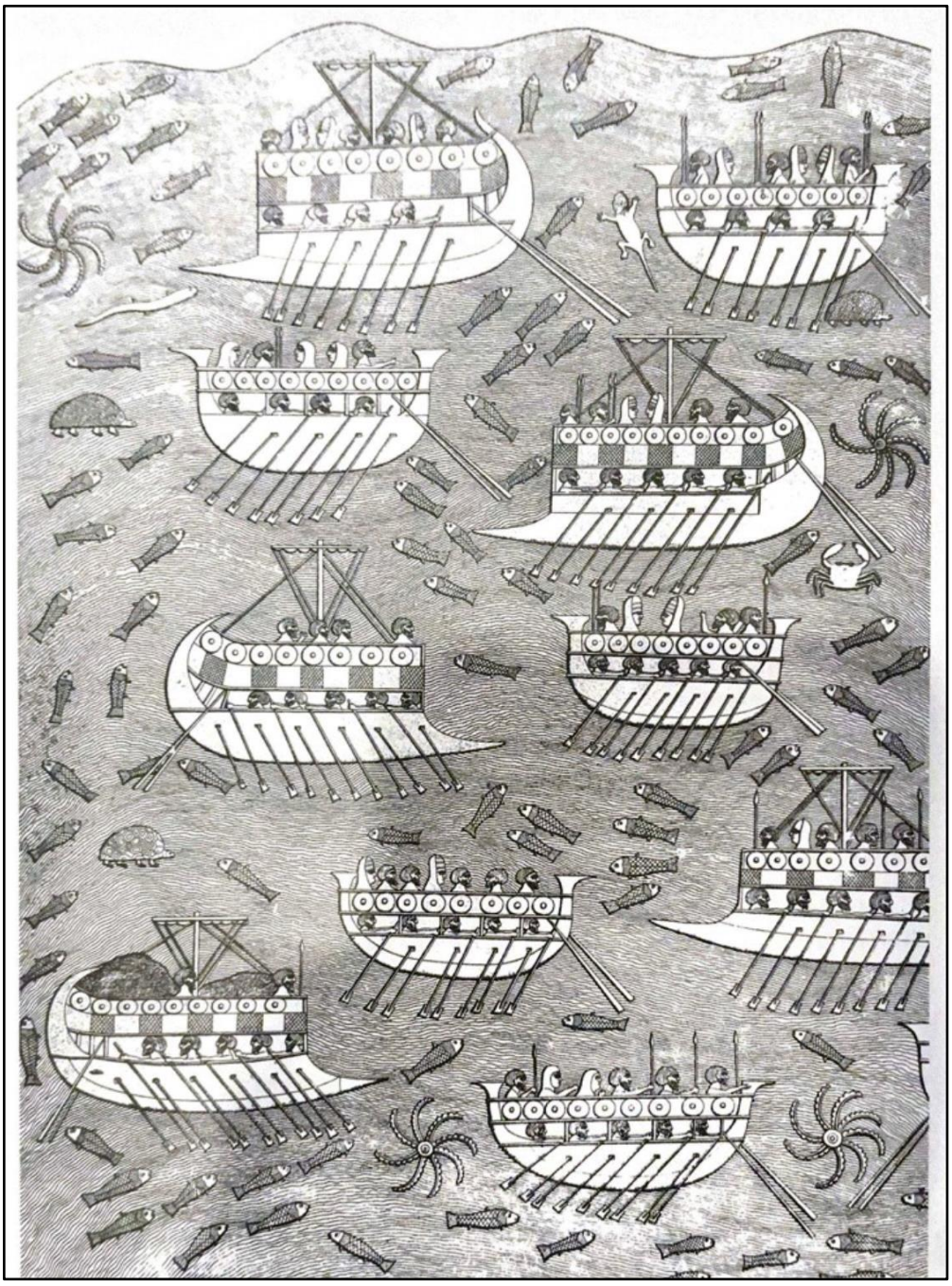

FIGURE 5: Phoenician civilian and military galleys evacuating Luli, 702 BCE (Wallinga 1995:43).

Throughout the 8th century BCE, key developments were made in ship construction and design throughout the Mediterranean region. Wallinga (2000) posited two distinct but complementary phases of development over a 300-year period. The first phase saw Greek

shipbuilders' experiment with variable seating arrangements, attempting to increase rowing capacity without increasing the ship's beam. Those vessels resulted in a longer, narrower hull design that allowed greater speed while maintaining the maneuverability of a shorter watercraft. Referred to as pentekontoros, they originated in the mid-8th century BCE and quickly gained popularity throughout the Mediterranean. Compared to the eikosoros and trikontoros, pentekontoros were much heavier vessels with two lines of 25 rowers. Used in conjunction with official state affairs, the pentekontoros was among the first early warships coming out of the ancient Mediterranean (Wallinga 1995:36).

The second phase proposed by Wallinga (2000) occurred between the 6th and 7th centuries BCE as a direct result of 8th century developments. This second phase, saw Mediterranean galleys built to increasingly larger specifications. In a direct modification of the pentekontors design, Phoenician shipbuilders created the bireme by adding a second deck of rowers to each side of the galley, thereby doubling the rowing power of the vessel without having to lengthen the ship (FIGURE 6) (Scott 2018:30). From the Phoenician bireme, an even larger and more powerful vessel developed. Dubbed the trireme, this type represented a true, dedicated naval watercraft and quickly became the reigning warship throughout the Mediterranean for the next three centuries. Eventually, the growing size of Mediterranean vessels led to four-decked quadriremes and five-decked quinqueremes, both of which were very large galleys built specifically for war, especially waged against other ships (Fawcett 1994).

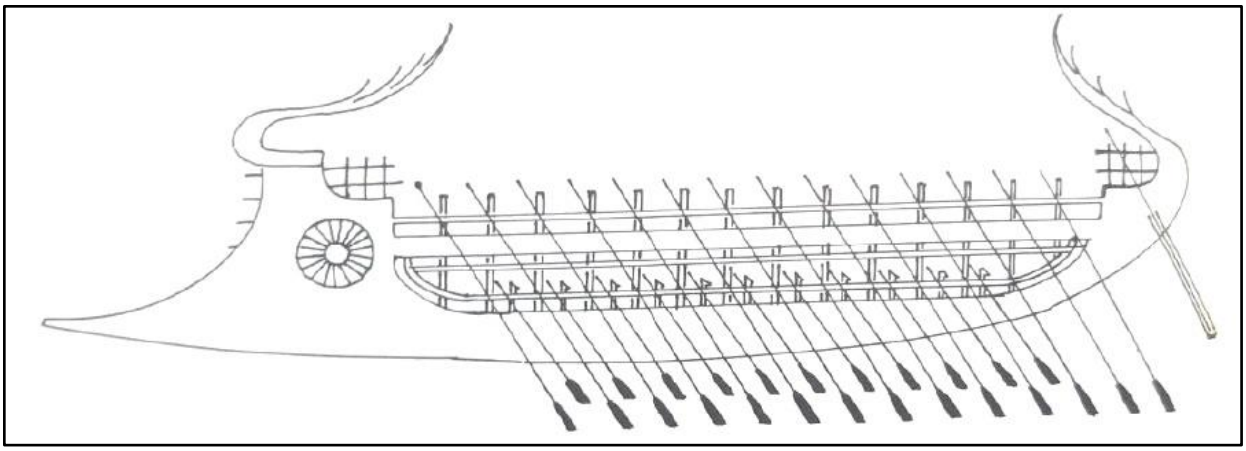

FIGURE 6: Profile depiction of an Athenian pentekontoros, 8th century BCE (Wallinga 1995:40).

A feature which became a staple of the various iterations of Mediterranean galley warships was a metal ram that projected from the bow at the keel. Ramming, in practice, was a relatively straightforward principle in which a vessel sought to gain speed to increase their momentum. Upon reaching peak momentum, the vessel deliberately collided with its target (usually another vessel), hitting it with the bronze naval ram fixed to a reinforced bow beneath the waterline. The goal of ramming was to punch a hole in a vessel's hull or cause other types of catastrophic damage by destroying the stern or the bank of sweeps (Fawcett 1994). Ramming tactics were extremely effective and quickly proliferated throughout the Mediterranean, where they dominated naval warfare for centuries.

Pinpointing exactly when the ram developed is difficult and remains a subject of contention (Fawcett 1994:83). The first known example of galley rams being used in battle occurred in the 6th century BCE as described in Herodotus' *Histories* (Fawcett 1994:85). Although outfitted with a variety of weaponry such as the *ballista*, weapons that launched projectiles capable of hitting a target at a distance since the Hellenistic period, galley ram tactics grew to define the primary mode of Mediterranean naval combat from the 6th to the 1st century BCE (Westphalen 2016).

Galleys from the archaic to the early Roman periods were constructed in a technique referred to as 'shell-first' (Hocker 1995:87). This term refers to creating a vessel's outer hull before the interior structural timbers were added as reinforcement. Vessels constructed in this style had planks that were edge-joined to each other and the keel. The edge-joined planks were fastened by a series of mortise and tenon joints spaced at even intervals down the length of the joint. Along the seams of each plank junction, the tenons were secured in place by oak pegs wedged transversely into place (FIGURE 7).

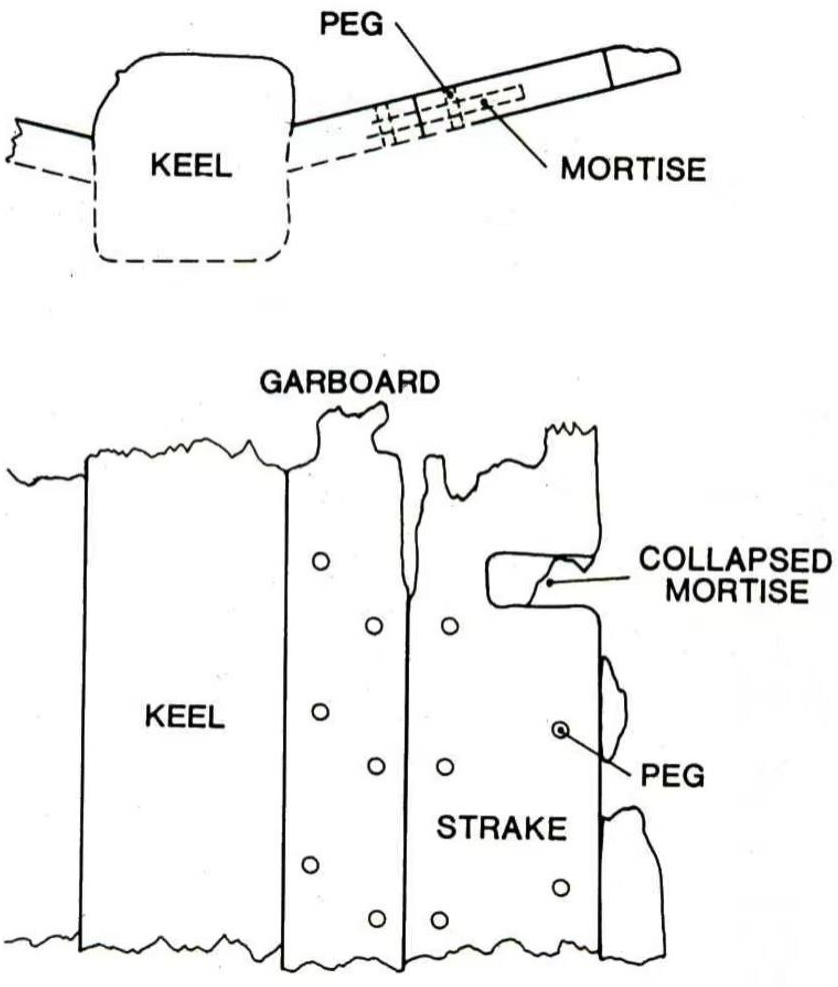

FIGURE 7: Construction features of edge-joined planks in profile (top) and plan (bottom) views (Adapted from Steffy 1994:37).

These vessels were constructed so that the body was evenly supported by its own weight (Morrison 1995a:50-53). The heavy, shell-first construction style caused these vessels to be very susceptible to structural harm when impacted. They often came completely apart by the force of their own weight, as indicated by accounts of Persian galleys 'exploding' from the force of being rammed (Morrison 1995a:60). Starting around 300 BCE, galley warships steadily increased in size as the Mediterranean countries engaged in an arms race while attempting to outcompete each other on water. This competition eventually nullified the once mighty trireme (Morrison 1995b:66-69). Stemming from Carthaginian developments, the quinquereme saw extensive use by the Macedonian Empire in their conquest of Greece. Commanders serving in Alexander's navy combined their war galleys and siege engines to devastating effect. In 332 BCE at the Siege of Tyre, Macedonian engineers built multiple large naval battering rams by bringing two war galleys abreast and lashing a large ram between them. These rams were so large they were able to break down the stone walls protecting the harbor of Tyre, thus ensuring Macedonian victory (Fawcett 1994:85-86).

While galley design and use throughout the Mediterranean world underwent several changes, certain characteristics of the galley remained unchanged: shallow draft, flat bottoms, oar propulsion, and a focus on using the vessel's bow and stern areas for combat (Hocker 1995:88-90). The rise of the Roman Republic in the 5th century BCE saw the role of the state navy redefined. Gone were the days of the massive navies that defined the Hellenistic period. Roman hegemony saw conquest via land, and the sea was relegated to a secondary logistical transportation role, although the Roman navy was later militarized in response to the maritime threat posed by the Carthaginian fleet (Rankov 1995:78-79, 100).

Roman imperial hegemony culminated in the 1st century BCE with Octavian's victory at Actium which, in addition to bringing about the Roman Republic's transition into the Roman Empire, also marked the end of classical naval warfare (Hocker 1995:86). Changes following Octavian's victory in 31 BCE re-contextualized how and why galleys were used. Rome sought to maximize its resources through standardization. Under Roman naval doctrine, larger warships were used primarily as flagships and seldom acted in a primary combat role (Hocker 1995:88-89). Romans employed a 'one size fits all' model meaning they tried to do many things with one ship type as opposed to the Hellenistic tradition of making special ship classes for specific roles or purposes (Pryor 1995:101-102). Arising out of that philosophy, Roman navies consisted of a multitude of smaller ships, most often employing iterations of biremes and triremes to great effect. Such vessels were generally referred to as *liburnia*, a vessel design originating with the Liburnians, a people who inhabited a territory in the Northeast Adriatic, part of modern-day Croatia (Smith 1854:175).

As warfare around the Mediterranean shifted away from nautical battlefields, ramming tactics used on the high seas diminished as well. While Romans primarily used smaller galleys, triremes remained in Roman service until the 4th century CE. Tactical changes in turn influenced galley construction as Roman naval fleets were utilized to control strategic access points and had the primary responsibility of conducting riverine and coastal patrols between the 1st and 3rd centuries CE (Rankov 1995:84-85).

The concurrent development of the square rig on Roman galleys reflected the coastal and riverine environments where they were employed (Hocker 1995:90; Pryor 1995:101). As the functional roles fulfilled by galleys changed, however, so did their construction and design. While the square rig was the primary type used on galleys and persisted until the 6th century CE,

rigging incorporating lateen sails was widespread throughout the Mediterranean by the 2nd century CE.

3.2. Byzantine Naval Traditions

The rise of the Byzantine empire saw the development of new galley types. Growing out of a Greek merchant galley referred to as the *keles*, Byzantine warships were generally referred to as *dromon.* The term dromon is broad, referring to different galley styles depending on when the term was used (Hocker 1995:94). For instance, in the 6th century CE, dromon referred to a fast, single-banked, mono-decked ship. Three centuries later, the term evolved to mean double-banked vessels without a continuous (sealed) deck (Hocker 1995:94). By the 10th century CE, dromon referred to several galley types as ships intended for warfare (Pryor 1995:102). By the end of the 10th century CE, the term denoted a specific, heavy class fighting ship (Hocker 1995:94). In addition to the 10th century dromon warship, the Byzantine navy consisted of a variety of warships called *chelandion*, *pamphylion*, and *ousiakos*, all of which were also generally referred to as dromon variants (Hocker 1995:94; Karkazis 2016:8).

Early dromon from the 5th and 6th centuries CE included square rigging, but by the 10th century the Byzantine empire had fully transitioned to a fore and aft lateen rig which allowed greater mobility (FIGURE 8) (Pryor 1995:100-101). Unlike earlier Hellenistic galleys which sought speed to inflict catastrophic damage by ramming, Byzantine dromons sought speed and maneuverability to control the nautical battlespace. In the 5th century CE Byzantine galley tactics were changing to complement the highly maneuverable dromon of that era. Due to the broad application of the term dromon, the precise dimensions used by the Arabic and Byzantine empires are unknown (Hocker 1995:95). One surviving source from 11th century Persian traveler Nasir-i-Khusru discussed warship dimensions and noted a dromon beached in Egypt as

being 85 m (278 ft) long and 35 m (114.8 ft) in the beam (Hocker 1995:95). There remains some contention regarding this source, however, as modern scholars have questioned the accuracy of Nasir-i-Khusru's account and posited a slightly smaller length and beam measurement for dromon of the 10th and 11th centuries, suggesting a length of 35 to 40 m (115 to 131 ft) with a beam of only 6 m (20 ft) (Hocker 1995:95).

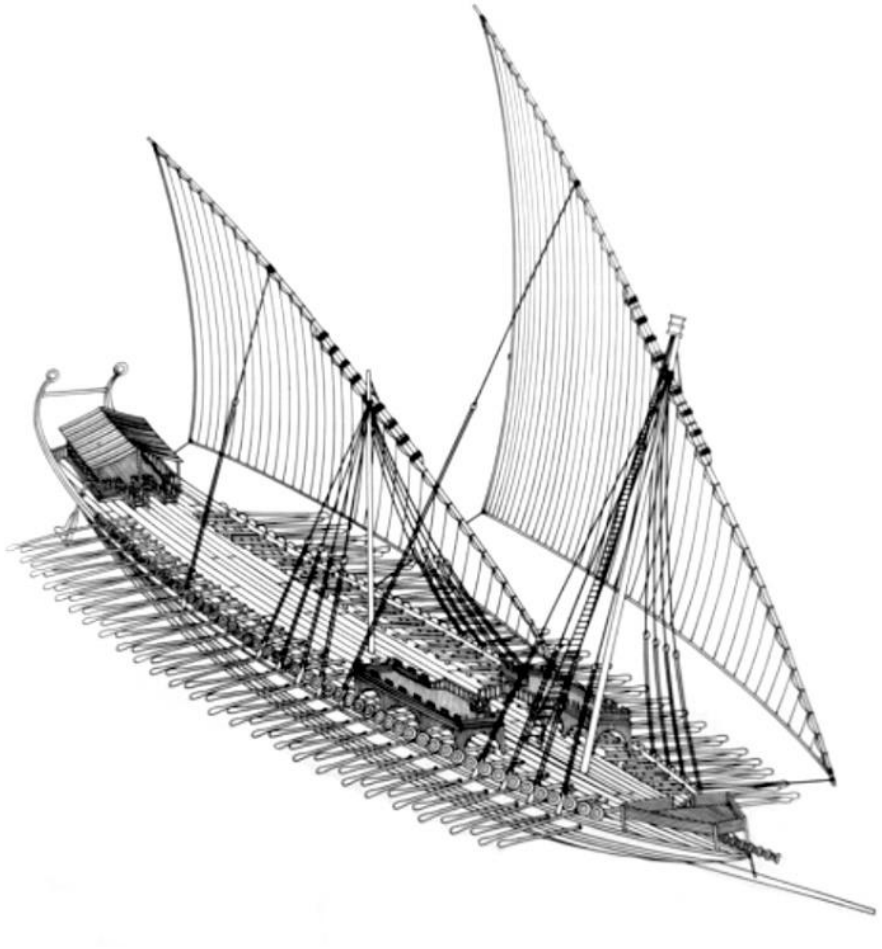

FIGURE 8: Artistic impression of a 10th century lateen rigged Byzantine dromon galley (Pryor 1995:103).

Dromon used a modification of the older breakwater ram, changing from a traditional submerged ram into an above-water metal spur. Although mounted on the bow, this spur called a *calcar*, projected above the waterline, and was not intended to cause catastrophic hull damage to an opposing vessel. Used in a similar fashion as a ram, calcar equipped vessels collided with the

hull of an enemy ship, but instead of intending to sink it, the metal spur raked the oar banks thereby disabling its mobility. Additionally, the spur was used to "roll the enemy ship over by the weight of the bows so that it shipped water and sank" – literally tipping the enemy vessel over (Pryor 1995:102). To maximize the potential of the calcar, war galleys or dromon were constructed with increasingly long and slender lines. In the late 12th century CE, Venetian shipwrights developed a new galley type heavily influenced by dromon designs dubbed the g*allee sottili*, or slender galley (FIGURE 9). This vessel type was also referred to as a *galea* and remained the primary Mediterranean galley type until the 16th century, when the calcar was phased out and, in its stead, gunpowder weaponry was mounted on the bows and sterns of galleys (Pryor 1995:109-110).

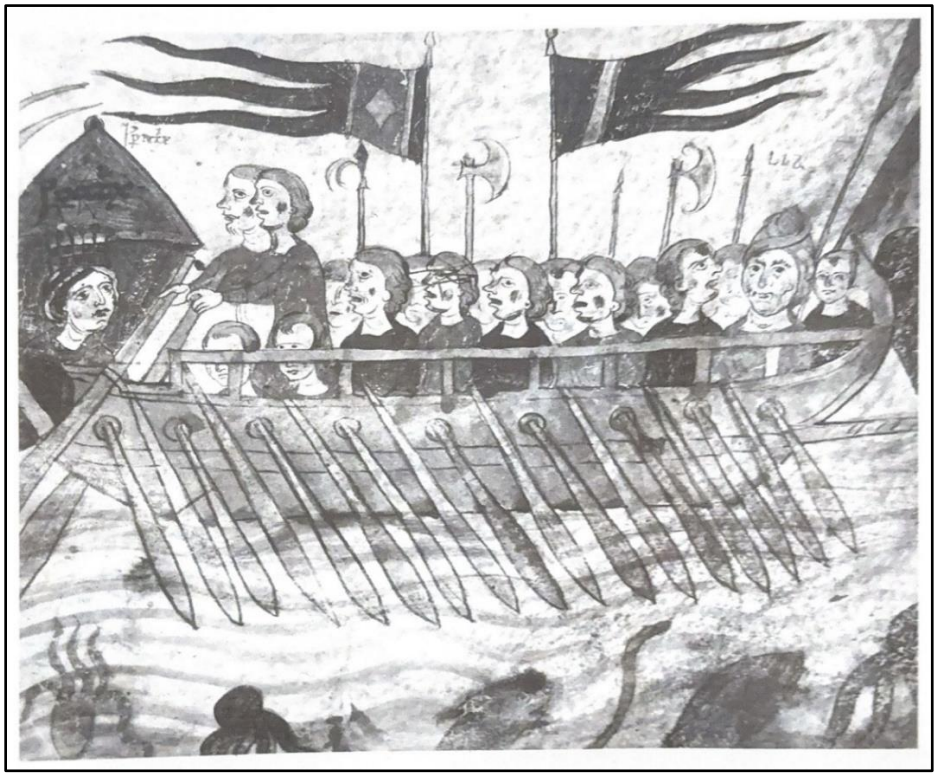

FIGURE 9: Late 12th or early 13th century CE g*allee sottili* (Pryor 1995:109).

As ramming tactics changed, so too did the various types of weapons used aboard ships. Ballista (or ballistae) were torsion powered weapons designed to launch bolts and other

projectiles at considerable speeds. These weapons were accurate up to 400 m (1312 ft) and featured prominently in galley warfare (Hosch 2025). As mentioned previously, ballista were in naval combat since before the rise of the Roman Empire as anti-personnel weapons and tools to grapple ships (Westphalen 2016). By the 8th century CE, the Byzantines employed a wide array of specialized naval ballista specifically for use aboard galleys. Called *toxobalistrai* and *cheirobalistrai*, these ballista launched projectiles at the enemy. The cheirobalistrai was a heavy bolt thrower, while the toxobalistrai was a light weapon invented specifically for using fire arrows, a projectile deemed highly valuable by the Byzantines (Hoffmeyer 1966:138-139; Pryor 1995:105).

In addition to missile weaponry, flamethrower technology developed by the Byzantine Empire led to the introduction of the *cheirosiphon*. This flamethrower required a special artillery corps called *siphonators*, who operated cheirosiphons mounted at the prow of war galleys. Combined with catapults that launched quick-lime pots and cranes that dropped flaming debris aboard enemy vessels, the range of weapons used in naval combat became increasingly lethal (Hoffmeyer 1966:42).

To protect rowers below the weather deck, Byzantine dromon modified several defensive design features from earlier Roman galleys (Pryor 1995:104-105). One prominent defensive structure built on galley decks was fortifications called castles, inspired by Roman naval siege equipment. Castles were raised structures that sheltered combatants; erected on the weather/main deck between the fore and aft masts which protected the crew against projectiles. From the 10th to the 13th century CE, dromon increasingly resembled floating fortresses, equipped with ramparts midship, castles at the stern, and flamethrowers fixed to their bows. The introduction of these weapons resulted in an alteration of battle tactics. With highly lethal weaponry, ships could

now be disabled without having to rely on the calcar spur as the primary damage inflictor, instead, flamethrowers and quicklime pots were used to burn away rigging and castles. Such weapons allowed sailors to disable enemy ships without having to ram or board them (Pryor 1995:104-105).

While the use of a full (or continuous) deck separating the rower below from the open deck above was common for 8th and 9th century CE Byzantine dromon, it had fallen out of style by the 12th century CE and was replaced by an open deck with castles located on the galley's bow and stern (Pryor 1995:104-105; Karkazis 2016:7). By the 13th century CE, expanded trade routes brought Scandinavian boat building traditions and techniques to the Mediterranean, leading to further variations in design.

Scandinavians introduced another type of galley that evolved from the long ship. Referred to broadly as a barge galley, this type of vessel was constructed in a style called "clinker built" which featured overlapping hull planks (Steffy 1994:100). Shipwrights throughout the Mediterranean had historically used a construction technique referred to as "carvel built," a construction style evolved from the edge joined hulls of the ancient Mediterranean. Despite the different construction style, the new vessels were still galleys as they had flat bottoms, shallow draft, and were propelled primarily via oar power (Guilmartin 2002:23). While the square rig fell out of favor in the Mediterranean region by the 6th century CE, it survived and thrived in Scandinavia and was reintroduced into the Mediterranean between the 13th and 14th centuries CE (Pryor 1995:101).

The use of a variety of construction styles combined with the reintroduction of the square rig saw ship designs and styles vary widely. Tub-like cogs used by the Hanseatic League soon faced off against fast-moving, slender Scandinavian and Mediterranean galleys. Though

exposure to alternative ship designs combined with the 13th century CE introduction of gunpowder, galley styles began to vary even more. Although gunpowder weapons were loud and frightening, firearms were still in their early stages of development, and their subsequent application(s) were not yet efficient. Since the use of gunpowder initially played a minor role in engagements, older style weaponry was more effective (Guilmartin 2002:22). The effectiveness of the older weapons over the new gunpowder technology resulted in tactics such as the calcar remaining in active use well into the early 17th century CE (Pryor 1995:111).

3.3. The Rise of Gunpowder

A long-standing feature of galley vessels was the undefined nature of their rigging. Able to sport a wide variety of rigging types, the galley maintained its classification due to its shallow draft, flat bottom, and reliance on oar-based propulsion. From Greek triremes to Roman biremes to Byzantine dromons, Mediterranean galleys went through multiple phases of transition which broadly reflected their use. For nearly a thousand years, war galleys were built around the ram, a feature which itself went through multiple phases of development. The advent of gunpowder in the western world, however, resulted in tactical and structural changes.

As gunpowder weaponry was increasingly utilized in both terrestrial and naval contexts, the Byzantines and Papal States, which already had rich naval traditions, sought to implement gunpowder-using devices as replacements for older weaponry (Pryor 1995:105). Gunpowder weapons replaced flamethrowers in much the same way and by the 15th century Byzantine dromon and Venetian galea sported cannon mounted on a vessel's bow and stern. When scaled up in size, gunpowder weaponry offered effective destructive power. Despite the proliferation of gunpowder weaponry, engagement tactics were slow to change due to the inefficiencies of early cannon. This is evident by its general absence in the 14th century battle of Sluys (1340 CE),

where English and French fleets engaged in what was effectively a land battle fought with ships (Guilmartin 2002:24-25, 29).

The true dawn of the gunpowder era in Europe is generally attributed to the late 14th century CE when cannon were used in an artillery context for siege warfare throughout the continent. Cannon first made a significant impact at the Siege of Chioggia (1379-80 CE), where they were used in large numbers against the city's fortifications (Guilmartin 2002:42-44).

Seeking to harness the devastating potential of large artillery, early 16th century CE Mediterranean shipwrights armed galleys with cannon (Guilmartin 2002:22). The guns were mounted on the bow by fastening them to the deck. Due to the galley's low profile and high maneuverability, bow mounted cannon gave considerable advantages against the larger, less mobile English cog as they could outmaneuver and outshoot the English vessels. As gunpowder weaponry became a staple armament on vessels, a permanent structure on the galley's bow and/or stern dedicated to housing its guns, called a *rambade*, was developed in the early 16th century (FIGURE 10) (Guilmartin 1974:200; Stroud 2002:22-23).

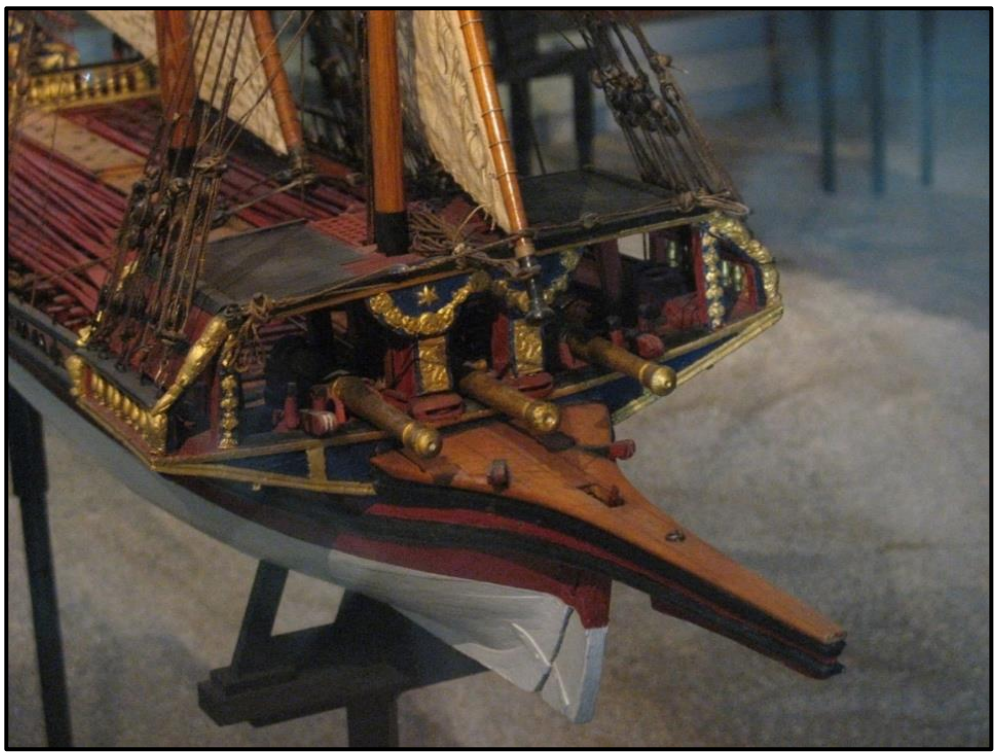

FIGURE 10: Rambade on stern of model of early 18th century Swedish galley by Axel Lewenhaupt circa 1715 (NMMS 2025).

By the mid-16th century, cannon were the primary armament of Mediterranean galleys. Despite the proliferation of gunpowder-based weaponry, naval combat tactics remained largely characterized by melees which produced heavy losses (Guilmartin 2002:116). One notable engagement that led to a reshuffling of naval combat strategies was the Battle of Lepanto in 1571, where a coalition fleet made up of allied Mediterranean maritime states engaged an Imperial Ottoman fleet (FIGURE 11). Many vessels at Lepanto were armed with gunpowder-based weapons including ceramic hand grenades and early long gun variants such as the arquebus, as well as cannon made of iron and bronze. The Battle of Lepanto marked an interesting time in both ship design and cannon use, since many vessels employed a mix of sail and oar power and a wide variety of cannon types (Guilmartin 2002:116-118).

FIGURE 11: *The Battle of Lepanto*, *7 October 1571*, artist unknown (RMG 2025).

Smaller galleys used at Lepanto called *galera* (FIGURE 12) had heavy cannon mounted on the rambade and weather deck. Those cannon served a dual purpose of launching lethal projectiles and causing chaos throughout the lower decks of rowers from the booming noises they produced. Due to the presence of hundreds of rowers on the lower decks, cannon wrought devastation throughout the battle. Enough well-placed shots along the oar decks effectively rendered an opposing vessel immobile (Guilmartin 2002:116-118).

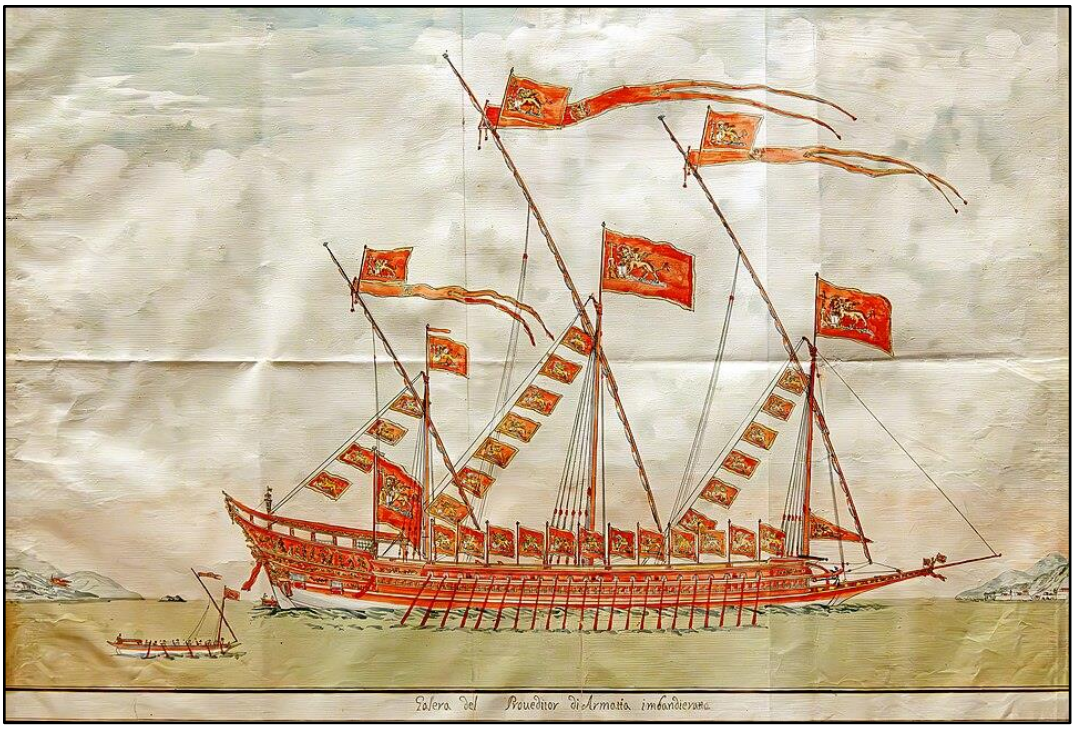

FIGURE 12: Galera del Provveditor di Armada imbandierata, artist unkown (Museo Correr 2025).

The Battle of Lepanto also saw the Venetians using the *galleass* as their main force vessel type . The galleass originated in the late 15th century CE as a large, dedicated warship that incorporated both oar and sail power. Galleasses were essentially very large, three-masted galleys carrying heavy artillery. The galleass was arguably one of the first true floating ordnance fortresses in the western world; the later galleon designs arose from the Mediterranean galleass (Guilmartin 2002:22). Outfitted with a wide range of cannon, galleasses could be rigged with lateen or square sails which assisted their ability to maneuver into firing positions and direct a hail of projectiles to support the smaller and lighter front-line galleys.

Although gun carriages were invented in the decades prior to the Battle of Lepanto, many cannon placed along the bows and sterns of galleys were not mounted on carriages. Rather they were bolted to the rambade and/or weather deck, which had the consequence of forcing the ship to endure the gun's recoil, often causing structural issues (Bunyard 2019). Cannon aboard

galleys at Lepanto were a mix of breech and muzzleloaders, resulting in inconsistent timing between volleys. To compensate for the increased reloading time, many rail mounted swivel guns were designed as breech loaders and equipped with grape shot. The breech-loading mechanism on swivel guns allowed for faster reloading, but at the cost of range.

The main tactic used at Lepanto was still ramming enemy galleys and attempting to break their oars with a calcar spur. After an enemy's oar bank was successfully disabled, the next action involved boarding the enemy ship. In effect, the weather decks on the galleys became large platforms to facilitate what were essentially land battles with both swivel guns and arquebuses acting as anti-personnel weapons after the ships collided. The employment of older, ship boarding melee tactics resulted in a very high number of casualties at the battle (Stevens and Westcott 1920:107).

Although the Battle of Lepanto was largely characterized by ship-to-ship boarding actions, the late 16th century saw the steady diminishment of these tactics and eventual elimination of the calcar by the mid-17th century. European maritime warfare tactics shifted in the late 16th century to a greater emphasis on intense firepower. While there were variations in preferred shot size between countries, 16th and 17th century European vessel armaments utilized larger projectiles and heavier cannon. Increased use and prevalence of heavy cannon, such as the culverin and demi-cannon, saw the transformation of naval combat into an exchange of cannon fire instead of boarding actions. The new goal was to simply batter an enemy ship into submission or destroy it through devastating weapons fire (Muller 1780).

Ramming, a tactic which prevailed for a millennium throughout the Mediterranean became largely obsolete through the extensive developments in weaponry (Hoffmeyer 1966; Pryor 1995:104-105). Although ramming remained a tactical feature in naval battles well past the

16th century, the ram's use changed dramatically. It went through three distinct phases: from originally making the galley a torpedo into using the galley as a spike for disabling enemy ships and finally being used as a method of last resort during the late colonial period.

Diminishment of the naval ram was largely due to use of armaments such as the demi-cannon and culverin, powerful ship killing guns which fired 32- and 18-pound projectiles, respectively. Heavy cannon like the culverin had the capacity to punch through ship hulls. Compromised hulls caused a ship to take on water, slowing it down so that smaller cannon, demi-culverins, minions, and sakers, could sweep the upper decks to damage the rigging and disable crew. Such cannon varieties were combined together on one massive type of warship, called the galleon.

Galleons were originally a Spanish design that resulted from combining the firepower of a galleass with the hull design of a cog type vessel. Generally ungraceful, massive vessels they mounted many heavy guns and were used to facilitate the transatlantic and transpacific trade of the Spanish colonial empire. Galleons served the dual purposes of being highly spacious cargo ships while also being extremely formidable in battle. A particularly noteworthy feature of galleons was their impressive armament; they often carried upwards of 40 heavy cannon on a gun deck, combined with lighter artillery and swivel guns mounted along the top deck. Bristling with firepower, these ships replaced galleys as the flagships of late 16th century armadas (Phillips 1986:68-70).

3.4. The Early Modern Era

The presence of consistently larger armament and vessels through the 17th century saw the galley's use shift from the main line of naval combat in favor of larger purpose-built military vessels. In the mid-18th century, a term that once referred to a Middle Ages light galley, the

fregada, now referred to a larger, single decked, three masted vessel of French design called a *frégate*, or *frigate* by the British (Gardiner and Morrison 1995:249). As a response to French naval developments, Great Britain quickly sought to construct their own frigates, similar in size and scope. The "true frigate" of the 18th century was a circa 32-gun, square-rigged three masted vessel with its armament on a single gun deck. Throughout the 18th century, several variations of the frigate were developed that altered the vessel's armament and deck number (Bowen 1943:203-204; Lavery 1987:121-122l).

By the time of the American Revolution, the term *frigate* was widely used to define a three masted, ship-rigged warship which had its main armament on a single gun deck (Fowler 1976:190). Frigates at that time could vary in armament, some carrying as few as 24 cannon to as many as 36 (Fowler 1976:190). The term *ship*, as used in the 18th century, referred specifically to a three-masted vessel with a square rig on each mast, fore, main, and mizzen (Fowler 1976:188; Lambert 2000:27-28).

Galleys of various types remained in widespread use throughout Europe and North America well into the 19th century. Small merchant galleys, for instance, found a prevalent role throughout the coastal and riverine waters of colonial North America. Characterized by an extensive network of river and port systems, the growing economic giants that were the colonies of British North America made extensive use of galleys (by many names) for transportation throughout the east coast (Chapelle 1967:35; Fleetwood 1995:31-32, 73, 76).

The second half of the 18th century was characterized by a series of "radical developments" in the merchant shipbuilding industry, leaving many questions pertaining to the design(s) of these vessels (Broadwater 1985:312). Among the British North American colonies, an official naval organization was yet to develop. As a result, lines between merchant and

military were blurred in the context of colonial vessels. This led to a period of rapid development in ship construction due to wide-ranging environmental conditions among the colonies as well as the constant threat of piracy – a reality for many colonial merchant vessels. Those factors saw the importance of the galley's return as European settlers expanded economic infrastructure along the southeastern coast of North America.

In the first half of the 18th century the term 'galley' broadened; instead of including only vessels propelled via oar power, it referred to a class of light and fast, or nimble, vessels (Chapelle 1967:11). The term galley fell out of use, and by the time of the American Revolution the term reverted to its original reference of a vessel with a shallow draft, flat bottom, and reliance on oar-based propulsion (Chapelle 1967:11; Fowler 1976:189; Sanchez-Saavedra 1978:156). Though the precise reasoning for the terminological variation is unknown, it may be related to European shipbuilding traditions of the time which persisted out of necessity due to the hydrography of colonial ports, well after the term fell out of more generalized use.

Unlike the deep-water ports of Virginia or Pennsylvania, those in the south, and the Carolinas in particular, are hydrographically characterized as unpredictable in nature and dangerous due to their changing shallow, sandy shoals (Fleetwood 1995:49-51, 69). Despite the treacherous hydrography, this region became an important heartland of the Royal Navy, supplying the British Empire with vital naval stores, the logistical resources which allowed ships to sail. To minimize loss to natural causes, the British used a specialized type of vessel called a *galley-ship*, that mounted three masts capable of sporting a full ship's rigging in addition to sweeps (Chapelle 1967:35-36; Fowler 1976:188).

Galley-ships reflected the era in which they existed - they grew in popularity out of a late 17th century response to traditional heavier British merchant vessels being pressed into naval

service (Chapelle 1967:35). Galley-ships were first established in a British American mercantile context due to their flat bottom hull profiles, as it allowed them to penetrate the shallow waterways of the southern colonies (North Carolina, South Carolina, and Georgia). As North Carolina grew to become an important naval store exporter for the British Empire, the galley design proliferated in use. The British introduced two galley variations, a large three masted derivative which was ship rigged and used throughout the southern coasts, and a northern variant, which was a two masted vessel with a square brigantine rig (Chapelle 1967:35-40). The southern galley-ship introduced by the British sailed alongside smaller, older, and much more common galley derivatives which had a longstanding tradition of use throughout the Carolinas. These earlier 18th century vessels were generally referred to as 'scout boats' and were galley variants of a log-based vessel type called *piragua* by the Spanish (Fleetwood 1995:32-34; Harris 2014). These vessels were rigged either with lateen sails or as schooners (and theoretically, brigs) and were built to large sizes in the Carolinas as early as the late 17th century by French settlers (Fleetwood 1995:40-41;71).

Galley-ships were expected to traverse a variety of ocean environments in an age of pirates and imperial privateers. To ensure their cargos were delivered safely, galley-ships were built with the capacity to mount weaponry (Chapelle 1967:35-36). Since they were smaller than full-sized merchant ships, they were cheaper to produce in large numbers (Chapelle 1967:35-36). While they saw extensive use throughout British America, few treatises relating to the type exist, with none known from North America.

Galley-ships possessed weather decks modeled after the Mediterranean traditions of the gallee sottili and galera of the 16th and 17th centuries. Unlike Mediterranean galleys, however, the lower hull of the galley-ship was designed as a cargo ship, resembling the hull shape of the

16th century northern European cog. As stated previously, no plans of American built galley-ships are known and few depicting British built galley-ships exist. One surviving example is that of the sixth rate, 20-gun galley-ship *Peregrine* (FIGURE 13). *Peregrine* was a vessel built on the orders of the Royal Navy in the early 18th century and was later converted (or, reduced, "razed") to a Royal yacht class. Renamed *Carolina* by the British government, it underwent several modifications including increased draft and installation of leeboards along port and starboard which aided in lateral resistance on the water, an issue that was common to larger galleys (Chapelle 1967:35).

While the plans of *Peregrine* depicted a large, tub-like hull, it retained the shallow deadrise and characteristic flat bottom of traditional galleys and a galea styled weather deck. The vessel was 26 m (86 ft) in overall length, 6.8 m (22.6 ft) in beam, and with a displacement of approximately 218 tons (Chapelle 1967:37). *Peregrine* was an older example of the galley-ship, as a multitude of shipbuilding developments occurred through the 18th century (Broadwater 1985:312). Galley-ships came in other variations from *Peregrine*, illustrated by another sixth-rate galley-ship, HMS *Lyme*, which began construction in 1739 and launched in 1740 (Chapelle 1967:62). *Lyme* was 32.3 m (106 ft) long and 9.1 m (30 ft) in breadth. The vessel had 24 guns and like *Peregrine*, was three masted and rigged with square sails. Unlike *Peregrine*, however, *Lyme* had a much sharper deadrise, an indication of the vessel's hybrid nature. Chapelle (1967) makes a direct comparison between the form and shape of the hull of HMS *Lyme* to the form and shape of hulls observed on later, American-built coastal schooners, specifically the Baltimore clipper (Chapelle 1967:62-64).

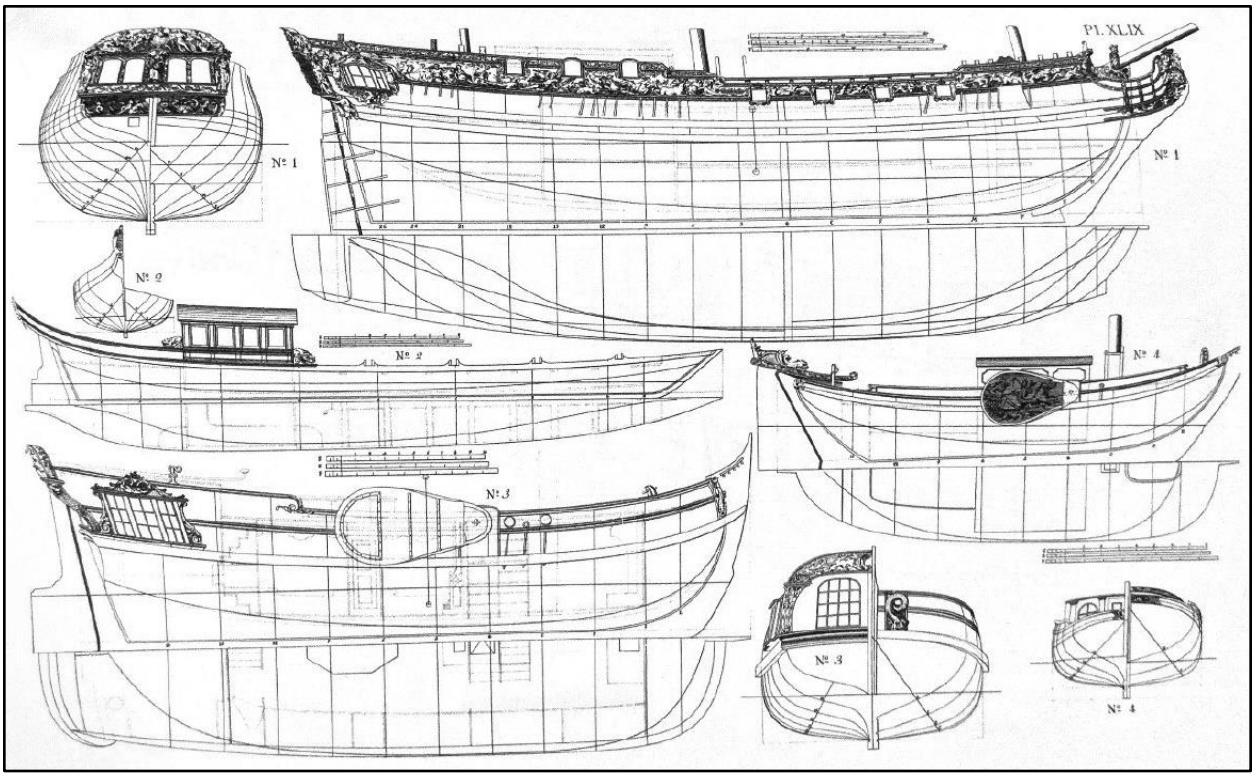

FIGURE 13: *Peregrine* galley, later converted into *Carolina* yacht (Chapman 2006:49).

The galley saw further variation throughout the North American colonies: shipwrights in New England adopted a brigantine rig for use on galley-ships, which ultimately led to a reduction in the size of the galley since only two masts needed to be rigged with square sails (Chapelle 1967:36). Traditions stemming from 18th century coastal brigantine galleys may have influenced the hull designs of later brigs, built for use on freshwater lakes during the war of 1812, such as USS *Eagle* (1814) (Crisman 2014:312). Unlike the brig tradition of the northern galleys, galley-ships with three masts and full ship rigging remained in use throughout the southern colonies well into the 18th century when one was used in a British raid against Edenton in the early summer of 1781 (Babits and Howard 2008:14).

In addition to the mercantile galley-ship, British North American colonies saw a derivation of the war galley return in the second half of the 18th century. When the Revolutionary War broke out in 1775, the Continental Congress was desperate to resolve naval

vulnerabilities. To shore up defenses, many colonies oversaw construction of their own state navies which heavily utilized a variety of merchant vessels including galleys. Galleys were chosen because they satisfied critical criteria for the colonies: they were quick and easy to build, with each hull only taking four to five weeks; they were highly maneuverable and needed little or no rigging for coastal and riverine operations; and they did not require experienced mariners to crew them and could readily accept raw recruits.

North American galleys came in many shapes and sizes. The northern Continental Army constructed smaller galley-like, flat bottom vessels dubbed ‘gunboats’ and ‘gondolas’ that sported a single square or lateen-rigged mast and oars, and measured between 13.7 m (45 ft) and 21.3 m (70 ft) long (Enright 1999:34). These vessels were armed in a similar manner to galleys in that they had a heavy cannon mounted at the bow, accompanied by broadside carriage guns, and swivel guns mounted along the cap rails. The hull shape of gondolas and gunboats resembled a galley as they shared design characteristics due to similar armament styles and the use of oars for movement. They could also be rigged in a variety of ways; they most commonly appear throughout the literature as lateen rigged (NHHC2 1966:240; NHHC5 1970:1151; Sanchez-Saavedra 1978:156; NHHC13 2019:581). Galleys were not constrained by their rigging; instead, they could carry a wide variety of rigs.

3.5. Continental Galley Design, Variation, and Rigging

The second half of the 18th century saw British colonial status quo challenged. After years of tension between England and the British North American colonies, war broke out in April 1775. To fight against such a powerful navy, Continental forces utilized many different types of galleys for naval defense. One of the first instances of galley combat in the American Revolutionary War occurred at the Battle of Valcour Island on Lake Champlain. This famous

engagement saw Brigadier General Benedict Arnold transform a few merchant sloops and newly built flat-bottomed watercraft into a fleet of galleys and gondolas (Nelson 2007; Seelinger 2022). The engagement probably saved the new country as it delayed a British thrust to isolate New England for a year (Fowler 1976:186). It was not just the Continental Army that converted vessels into galleys, however. At Valcour Island the British transformed a vessel originally intended as a sloop, into a galley when they ran short of rigging (Nelson 2007:86). The fact that both combatants embraced this type of craft illustrates just how incredibly versatile and well suited these vessels were for the local environmental conditions. Capable of rigging with sails in a variety of ways, or not at all, they could be staffed with personnel with a variety of skill levels, those who had extensive knowledge of sailing, as well as those with no nautical experience.

In both Continental and British contexts, many vessels were eventually purchased, then converted into galleys, gunboats, and gondolas (Nelson 2007:86). Throughout the revolutionary period, terms such as gunboat, gondola, and galley were all used nebulously. While each of these were applied to different vessel types, the terms appeared broadly interchangeable in primary source writing referring to shared characteristics between them: predominantly rounded, or 'bluff' bow, low freeboards, and a shallow deadrise (FIGURE 14). The ability of a galley hull to sport a variety of rigging was well documented throughout primary correspondence.

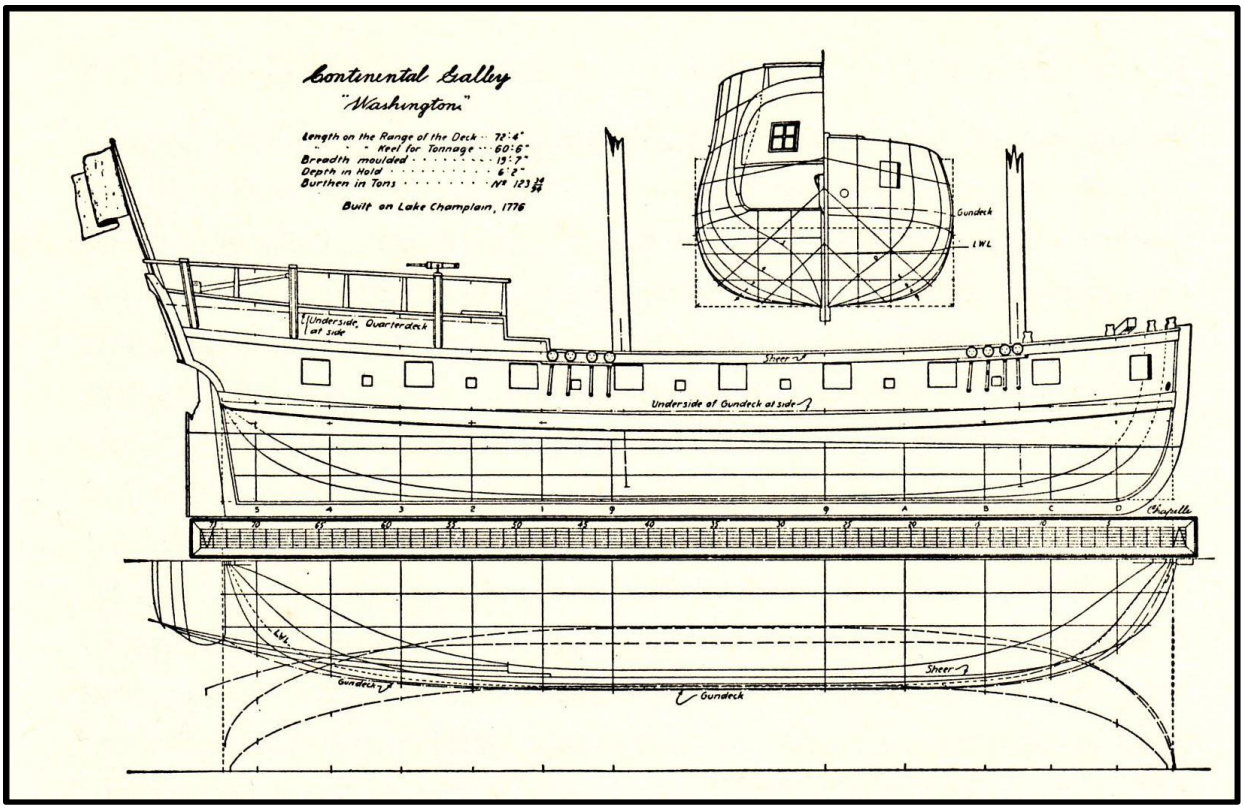

FIGURE 14: Benedict Arnold's Lake Champlain Continental row galley *Washington*, launched at Skenesborough, NY, in 1776 (Chapelle 1949:108).

Although the Virginia State Navy (VSN) modeled at least one naval galley sail plan off a Mediterranean inspired lateen rig (Sanchez-Saavedra 1978:156), lateen rigging was by no means a requirement for galleys. Traditionally, galleys from Arabia and the Mediterranean in the 17th century were lateen rigged (Dimmock 1946; Dotson 1995:222). Lateen rigging was straightforward: the lateen sail was supported by a shorter, thick mast raked forward to bow. Four stays set together over the masthead worked to secure the boom, with those on the windward side held taut, while those in the lee were slack. Larger lateen rigged vessels utilized one or more jibs to better catch the wind, in addition to adding more masts (Dimmock 1946:37). The lateen rig was regarded as a tricky type, not friendly to novice sailors. The difficulty of mastering the lateen rig undoubtedly influenced Continental forces in their choice to deviate

from lateen rigging in some cases of galley construction (Dimmock 1946:35; Sanchez-Saavedra 1978:157).

The Pennsylvania State Navy (PSN) constructed galleys for use on the Delaware River and built them with sail plans that deviated from lateen rigging. At least one PSN galley (*Washington*) was large and measured 32 meters (105 ft) long (NHHC3 1968:1355). Its sail plan is unknown, but judging by its length, it could have been three masted and square rigged. At least two other vessels, the *Delaware* (1776) and the *Convention* (1776), were built by the PSN and designated as galleys were not lateen rigged; instead, they were schooners, meaning that they had (at least) two masts and a bowsprit, with each mast raked aft (Biddlecombe 1969:109). Existing literature described these two vessels as 'armed schooners' but designates them as galleys, leaving some ambiguity as to their actual hull design and oar capacity (Jackson 1974:346). Their hybrid nature may be explained by their intended use, as they were constructed to cruise in the lower bay and along the Atlantic coast from New Jersey to Maryland, another example of the versatility of the galley (Jackson 1974:346).

Throughout the *Journal of the Commissioners of the Navy of South Carolina* (Salley 1912), letters of correspondence repeatedly refer to South Carolina State Navy galleys. Vessel such as *Comet*, *Notre Dame*, *Hornet*, *Wasp*, and *Defence*, were also frequently called "brigs," "brigantines-of-war" or "Brigts. Of war" (Salley 1912:5, 52, 78, 112, 261, 268). The term "brig," like the term "schooner," is a specific reference to a type of sail plan. A brig is two masted with square sails on both masts. Both the aft/main mast and foremast on a brigantine are stepped at an angle (raked) with the foremast leaning forward and aft/main mast leaning slightly back (Biddlecombe 1969:109). Despite being similar, there are notable variations between brig and brigantine rigging. Vessels with a brigantine rig also have their foremasts set with square sails,

but the aft/main mast is schooner rigged, meaning it has an abaft, gaff-rigged sail and a top-mast with a gaff-top-sail (a term that is interchangeable with a square main topsail) (Biddlecombe 1969:109). Both brig and brigantine rigging appear interchangeable in primary sources, a possible indication that the aft/main mast was swapped between schooner rig and square rig, as conditions required (Salley 1912). It is thought unlikely that many galleys constructed by state navies had anything higher than a topmast (Babits 2025 elec. comm.).

Larger galleys were constructed by Virginia, South Carolina, Georgia, and Delaware, but it was the VSN that featured the galley as its most common fighting vessel throughout the war (Sanchez-Saavedra 1978:156-159). While specifics regarding most VSN galleys are unknown, those constructed after 1776 may have been partly inspired by General Benedict Arnold's emergency naval galleys built on Lake Champlain. Many VSN vessels were converted into galleys from preexisting hulls (Fowler 1976:185-186; Nelson 2007:86; Sanchez-Saavedra 1978:156), but almost as many were built as galleys, and a common vessel throughout the American south in the 18th century. The specifications for one VSN galley survived; it is described as a small but heavily armed vessel modeled broadly after Mediterranean galleys (Sanchez-Saavedra 1978:156).

75 feet streight rabit [straight rabbit]
27 feet beam
10 feet hold
26-inch dead rise
Full Harping
Bottom 22-inch plank
Floor heads 3 Inch plank
One streak [strake] 3 Inch under the Wales and above them
3 Wales – waste [waist] 22-inch plank
Large scantling, strongly built forward and abaft
Beams 14 inches deep, well kneed, one horizontal and 1 dogger knee at each end.
Slides fitted at each end for 24-pound [pounder] Cannon, two in the Bow and two in the Stern
Six parts [sic ports] of a side for 9-pounders
Waste 3 feet 10 inches to rise forward to five feet
A quarter deck, sufficient to hole the officers
A spar deck, below for the [sailors]
Long grating hatches
24 row ports of a side
"The Rigg to be fixed herafter, at present it is intended to rig after the Mediterranean Galleys."

FIGURE 15. Measurements for one galley of the VSN (Adapted from Sanchez-Saavedra 1978:156).

Several galleys constructed by the VSN were much larger than the 22.8 m (75 ft) keel galley described above, including the 27.4 m (90 ft) long *Hero*, which carried two 18-pounder and one 24-pounder cannon. Its sail plan is unknown as it was bought at auction and dismantled in 1779 (Sanchez-Saavedra 1978:157); however, at least three other large galleys were built by the VSN: *Diligence*, *Gloucester*, and *Accomac*. *Diligence* was a three-masted vessel rigged with five sails (Sanchez-Saavedra 1978:157). It is possible that *Accomac* was also a three masted vessel, as the VSN specifically ordered the two galleys to be constructed together "for river and sea service"

(Thompson 1857:11). Like *Diligence*, *Gloucester* was also three masted, and possibly one of the largest vessels built by the VSN, as indicated by an order for rope issued in 1777 and sent to Captain Charles Thomas at the Warwick public ropewalks (TABLE 2) (Thompson 1857:11).

For main and fore shrouds	200	Fathoms of	5	Inch Rope
Do for fore and Jibb stays	30	Fathoms of	6	Inch Rope
Bowsprit shrouds	20	Fathoms of	5	Inch Rope
Mizzen shrouds	20	Fathoms of	5	Inch Rope
Main and foretopmast Shrouds	100	Fathoms of	3.75	Inch Rope
Mizzen topmast shrouds	35	Fathoms of	3.25	Inch Rope

FIGURE 16: Thomas Witting rope order sent to Captain Charles Thomas at Warwick, Virginia (Whiting 1777).

Further background research into *Gloucester* shows it was originally ordered to be 24.6 m (81 ft) long in the keel with a beam of 6 m (20 ft), but the true length is unknown (NHHC6 1972:199, 366, 1207). Despite *Gloucester's* large size and three masts, it was a galley as evidenced by a letter to Governor Littleton Waller Tazewell on behalf of George Brown, written by his family in 1835. The letter seeks a land bounty promised to George Brown for his service in the Revolutionary War. The letter reveals that George Brown served under Captain Thomas Lilley, on board "the *Gloucester* galley" (Brown 1835). Thus, from the primary source, it seems that *Gloucester* was constructed as a large, three-masted galley-ship, which may have originally been intended for service in riverine and open ocean environments. Due to the large size of *Gloucester*, it has been misidentified in historical literature as a 'ship,' a term which refers to a three masted vessel rigged with square sails, capable of open ocean service (Fowler 1976:188; Sanchez-Saavedra 1978:161).

Galleys constructed by the rebelling colonies were inspired by older Mediterranean vessels and broadly resembled a cross between a small 17th century CE cog and a 10th century CE dromon, with shipwrights from Virginia citing Mediterranean galleys to mimic rigging (Sanchez-Saavedra 1978:156). Revolutionary War galleys generally measured 21.3 m (70 ft) to 27.4 m (90 ft) in length, incorporated a rounded bow, narrow stern, and generally two masts, rigged either with lateen or square sails. This was by no means a rule of thumb as galleys were constructed to a whole range of proportions. For instance, South Carolina placed an order for a galley with a 30.5 m (100 ft) keel, 7.9 m (26 ft) beam and 3 m (10 ft) depth of hold in June of 1777 (Salley 1912:74). Thus, galleys represented a jack of all trades type of vessel, modified in construction to reflect the needs of different colonies and their variable hydrography (Snow 1936; Sanchez-Saavedra 1978).

The PSN sought to construct galleys for defense on the Delaware River, but unlike Virginia, Pennsylvania shipwrights built 13 medium sized galleys measuring over 15.2 m (50 ft) long under the oversight of the Eyre brothers: Emanual, Jehu, and Benjamin-George. Of these, only one galley, *Washington*, exceeded 24.3 m (80 ft) in length, and it may have been 32 m (105 ft) at the keel (Snow 1936; NHHC3 1968:1322). In Pennsylvania, galleys were also called 'gondolas,' referencing the venetian gondola, a vessel traditionally rowed, unrigged, and flat-bottomed. The use of this term in the American Revolution is perhaps a reference to the ability of the galleys to be rowed as well as sailed, as the term is used interchangeably with vessels rigged with sails (NHHC1 1964:1250). Thus, the term 'gondola' used as an interchangeable name for a galley seems to be a northern naming tradition as it does not appear in the southern colonies.

After defending the Delaware River, ten galleys were sold in 1781, and the remaining three were sold between 1782 and 1783. Other row galleys were built to smaller specifications,

and at least one (*Delaware*) was captured or destroyed by the Royal Navy in 1777 after a failed attempt to run a blockade (Snow 1936; Jackson 1974:346-347). The Eyre brothers were contracted by Congress to construct, or at least advise on, more galleys and gunboats throughout Pennsylvania, New Hampshire, Rhode Island, Connecticut, New York, and Maryland (Snow 1936). Additionally, Thomas Rice, brother to Philadelphia shipwright John Rice, travelled south to Georgia where he supervised construction of the state galleys *Bulloch*, *Lee*, and *Washington*. He may have employed his own shipwrights from Philadelphia to construct them (Fleetwood 1995:73). It is unknown how large those galleys were, but others constructed later in the war by the Georgia royal colony in 1780 were ordered with dimensions as similar as possible to captured Continental galleys (Fleetwood 1995:77-78). The galleys ordered by the Royal governor were decidedly larger than many PSN galleys, with requested dimensions of 22.9 m (75 ft) to 24.4 m (80 ft) 5 to 80 ft keel length, with 15 to 20 sweeps on each side (Fleetwood 1995:77-78). An historic vestige but consistent feature of those galleys was arming the bow area, or fore deck. Though not constructed with rams, the Continental Army installed one heavy cannon at the bow, as well as lighter artillery and anti-personnel swivel guns along midship rails (NHHC8 1980:268). The rounded aspect of those designs, as well as the characteristic flat-bottomed hull and low freeboards, resulted in a similar appearance of their hulls, which contributed to the nebulous nature of the galley as a vessel type, both literally and literarily, during the second half of the 18th century.

As tensions mounted in the early 19th century, the US looked to shore up its fleet presence on the Great Lakes. In 1813, William Doughty, Chief Naval Constructor at the Washington, DC, shipyard, drafted an early design for a light galley depicting a vessel of 28 oars, measuring 15.2 m (50 ft) long by 3.6 m (12 ft) wide, with a draft just over 0.9 m (3 ft)

(Emery 2003:42). In those first drafts, Doughty never specified the intended rig, a reflection of their versatility. Doughty's 1813 designs were scaled up in size for use in the following year and slightly modified by another master shipwright, Noah Brown, who increased the draft and deadrise to improve handling (Emery 2003:58-66).

In 1813 the US Navy developed a plan to standardize war galleys and proposed a plan for a galley measuring roughly 22.9 m (75 ft) long, 4.6 m (15 ft) in the beam, and a very shallow draft of less than 0.6 m (2 ft) (FIGURE 17). Those differed from their revolutionary period counterparts in several ways. First and foremost, the galleys built and used during the Revolutionary War were not based on a single plan. Lacking a formal navy, Continental military forces initially had to rely on state navies for defense. Vessels produced by the state navies varied and reflected the plans of individual shipwrights and their crew (Fowler 1976). Compared with those built during the Revolutionary War, War of 1812 row galleys had a length to beam ratio of 5:1—as opposed to the VSN ratio of 3:1 and the South Carolina ratio of 4:1—which worked to increase the vessel's speed. In sticking with the theme of increasing speed, the 1813 design incorporated more oars to maximize power generation (Emery 2003:42-43, 45, 269). Finally, unlike the Revolutionary War galleys, those of the War of 1812 era were armed with fewer, albeit heavier cannon; 24-pounders were consistently installed instead of the mix of 18- and 24-pounders often used during the Revolutionary War. The 1813 design ultimately represents one of the early attempts of the US Navy trying to mass produce a warship from a single set of plans (Emery 2003:167).

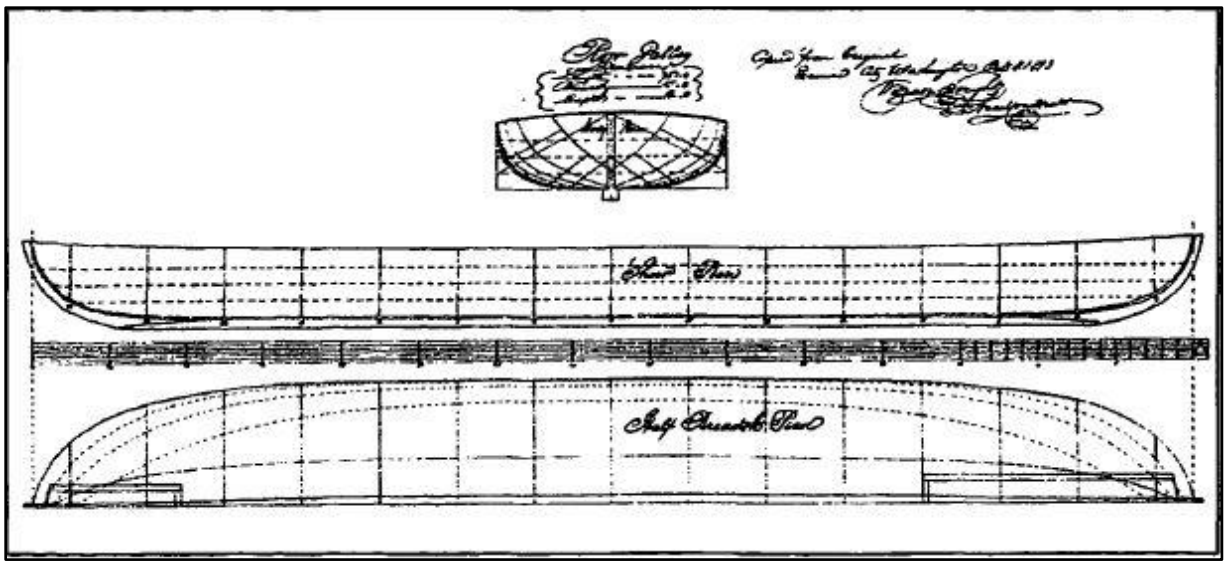

FIGURE 17: 1813 design plan for a 75-foot row galley (Emery 2003:58).

One example of a ship built with the new 1813 design was USS *Allen*, a two masted lateen rigged galley that served on Lake Champlain, fought in the battle of Plattsburgh Bay, and was stationed on the lake in the years following the war (FIGURE 18) (Emery 2003: iii). USS *Allen* was decommissioned, stripped, and sold sometime in the 1820s. The vessel was eventually abandoned in the Poultney River where it rested until it became the subject of extensive archaeological excavation and documentation in 1995 (Emery 2003:186). As USS *Allen* remains the only American-built galley ever archaeologically excavated, the resulting data and interpretation(s) is invaluable for nautical archaeological analysis.

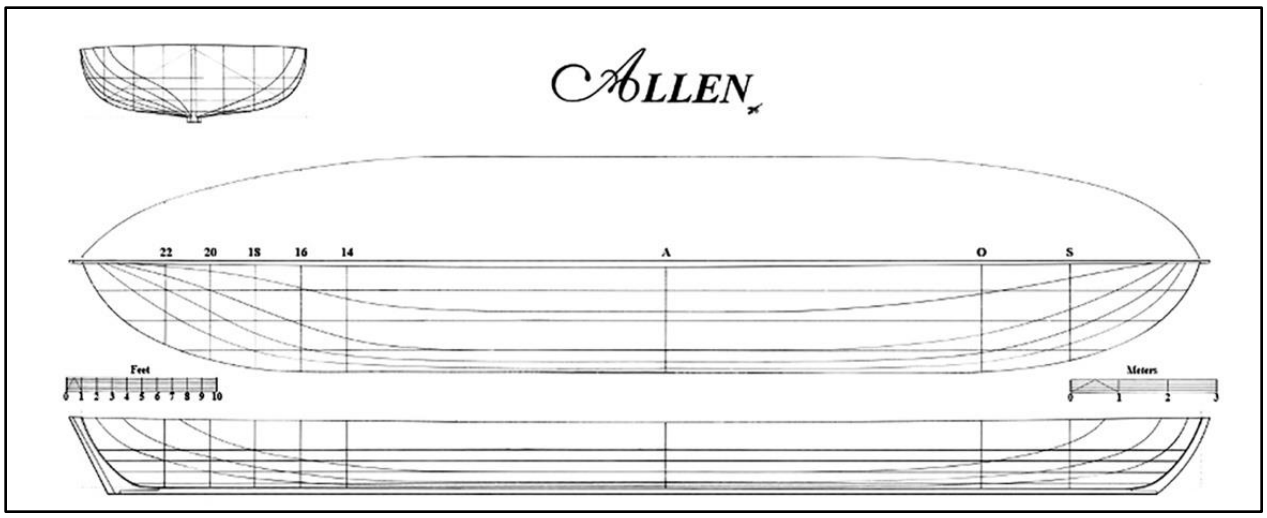

FIGURE 18: Lines drawing of USS Allen (Emery 1995).

3.6. The end of an era

Although the early 19th century saw a short uptick in the production of galleys and other oared warships within the US Navy (Emery 2003: iii), it was a brief return since nautical technologies rapidly moved away from traditional wind powered rigging and toward steam power. By the time of USS *Allen*'s construction, early steam ships were already employed in merchant shipping. The advent of steam technology marked the end of traditional wooden galleys, schooners, and ships. In 1839, the Royal Navy initiated the 19th century equivalent of the Manhattan Project with the secret construction of HCS *Nemesis* and its sibling ships (iron gunboat steamers), contracted and built through the British East India Company and ultimately deployed to southeast Asia (Bernard and Hall 1845:1; Wukovits 1944).

HCS *Nemesis* represented a fusion in steam technology that combined advantages of both galleys and larger ships. Built and launched in the span of only three months by Birkenhead Ironworks, HCS *Nemesis* became the first of England's iron steamers capable of open ocean operations. Over 55 m (180 ft) long, it incorporated twin steam engines that turned paddle wheels, as well as two masts and a fore and aft rig so that it could be converted into a traditional

sailing craft to save on fuel consumption or if its steam engine failed (Fay 1975:260-263). Taking inspiration from the flat bottom profile of galleys and galley-ships, HCS *Nemesis* and its siblings were constructed without a fixed keel, thus allowing a flat bottom (FIGURE 19). In addition to the flat bottom, it had a draft of only 2 m (6.6 ft) with a 3.3 m (10.8 ft) depth of hold (Bernard and Hall 1845:3). These structural features proved extremely valuable as they were used to smuggle opium through the Chinese riverine and coastal environments (Bernard and Hall 1845:2-4). A highly mobile vessel, HCS *Nemesis* could outmaneuver traditional galleys and ships in both riverine and open ocean environments. Combined with the ability to comfortably carry a wide array of both light and heavy weapons, HCS *Nemesis* was a true force with which to be reckoned. Constructed of iron, these steamers were durable, able to withstand cannon fire, devoid of shipworms, and could survive direct impacts with submerged reefs (Bernard and Hall 1845:167, 280).

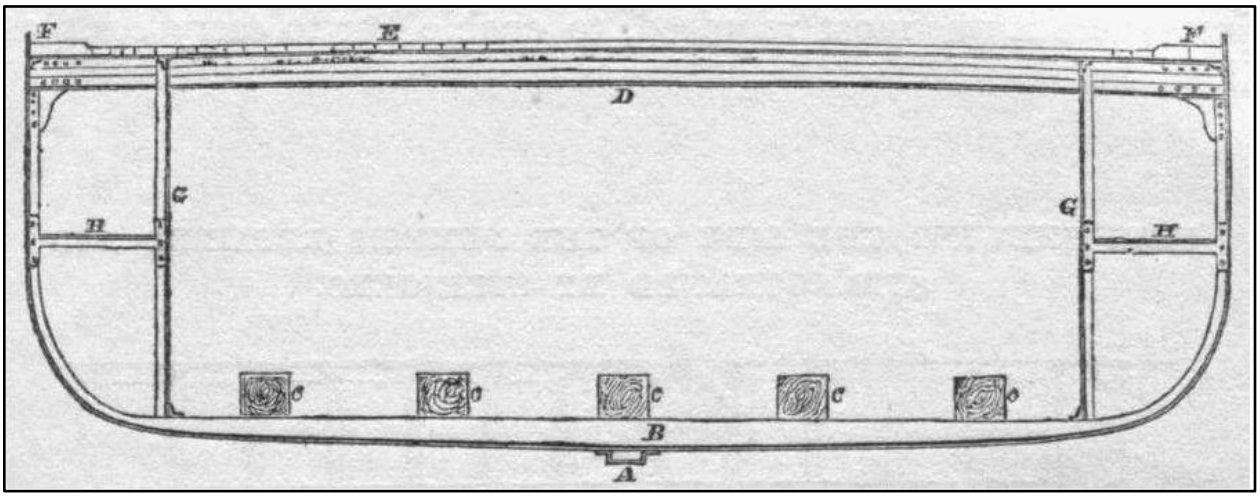

FIGURE 19: Transverse section at the engine-room of the iron steamer HCS *Phlegethon*, sibling ship to HCS *Nemesis* (Bernard and Hall 1845:31).

Iron steamers quickly brought an end to wooden sailing ships. Although slower than Great Britain in adopting iron hulled vessels for naval service, by the end of the 19th century the

US had all but eliminated traditional wooden sailing ships from both naval theaters and merchant shipping (Burgess 2016).

As a type, the galley survived an extremely long time. Outlasting civilizations and cultures, it found primary use in civilian and military applications where its design continually influenced naval strategy and technology. Galleys were a staple of maritime life in the Western world from the start of recorded history and though no longer used today, facets of their designs survive. Without a doubt, the flat-bottomed hulls, low freeboard, and shallow drafts of functional modern riverine transport vessels are reminiscent of the characteristic galleys of old. Thus, a wooden sailing vessel tradition developed over thousands of years was obsolete by the end of the 19th century (Burgess 2016).

Chapter 4. Archaeological Context

The John's Island Wreck (North Carolina site EDS0001/CO298) was the subject of three archaeological investigations since 1980. Based on circumstantial data gathered through the first two projects, the wreck's identity was tenuously associated with the cargo ship *Holy Heart of Jesus*, a vessel famous in the town of Edenton, for smuggling cannon during the Revolutionary War. This chapter provides an overview of the 1980 and 1993 archaeological investigations at the site and discusses the methods and findings of those projects. A discussion of the most recent investigation (2024) is then provided, which includes an updated site assessment and review of recovered artifacts, as well as new archaeological interpretations and justifications for them.

4.1. Previous Research

As one of NC's oldest towns and the site of the state's first colonial capital, Edenton and the surrounding area have been the focus of both terrestrial and maritime archaeological studies. Many of the town's 18th century structures are still extant, with notable sites in the vicinity of the town including the Chowan County Courthouse and the Hays Plantation site located south of Queen Anne's Creek. Along the town's waterfront are at least two other shipwreck sites; the 18th century Burroughs wreck and an early 19th century shipwreck located in the waters of Queen Anne's Creek (Watts 1981; Goodall 2003). Local lore speculated that *Holy Heart of Jesus* was also sunk near Edenton (Wiggins 1954), and townspeople embraced the interpretation that the John's Island Wreck could be *Holy Heart of Jesus* because the ship played such a significant role in the Revolutionary War (FIGURE 20).

FIGURE 20: Cannon located on the Edenton waterfront with attached plaque suggesting it is one of those delivered by William Borritz during the Revolutionary War (photo by author 2024).

4.1.1. John's Island Wreck Investigation 1980

In 1980, Gordon Watts and Richard Lawrence of the North Carolina Department of Cultural Resources UAU (later the renamed the Underwater Archaeology Branch [UAB]), conducted a survey in the waters around (Watts 1981:14; Babits and Howard 2008). Remote sensing techniques and visual surveys in specific portions of Edenton Harbor, Pembroke Creek, and Queen Anne's Creek identified several submerged heritage sites. Several of the targets represented sites long known to the town, including the John's Island Wreck (FIGURE 21), then called the Pembroke Creek Wreck, and Queen Anne's Creek Wreck (Watts and Lawrence 1980:23).

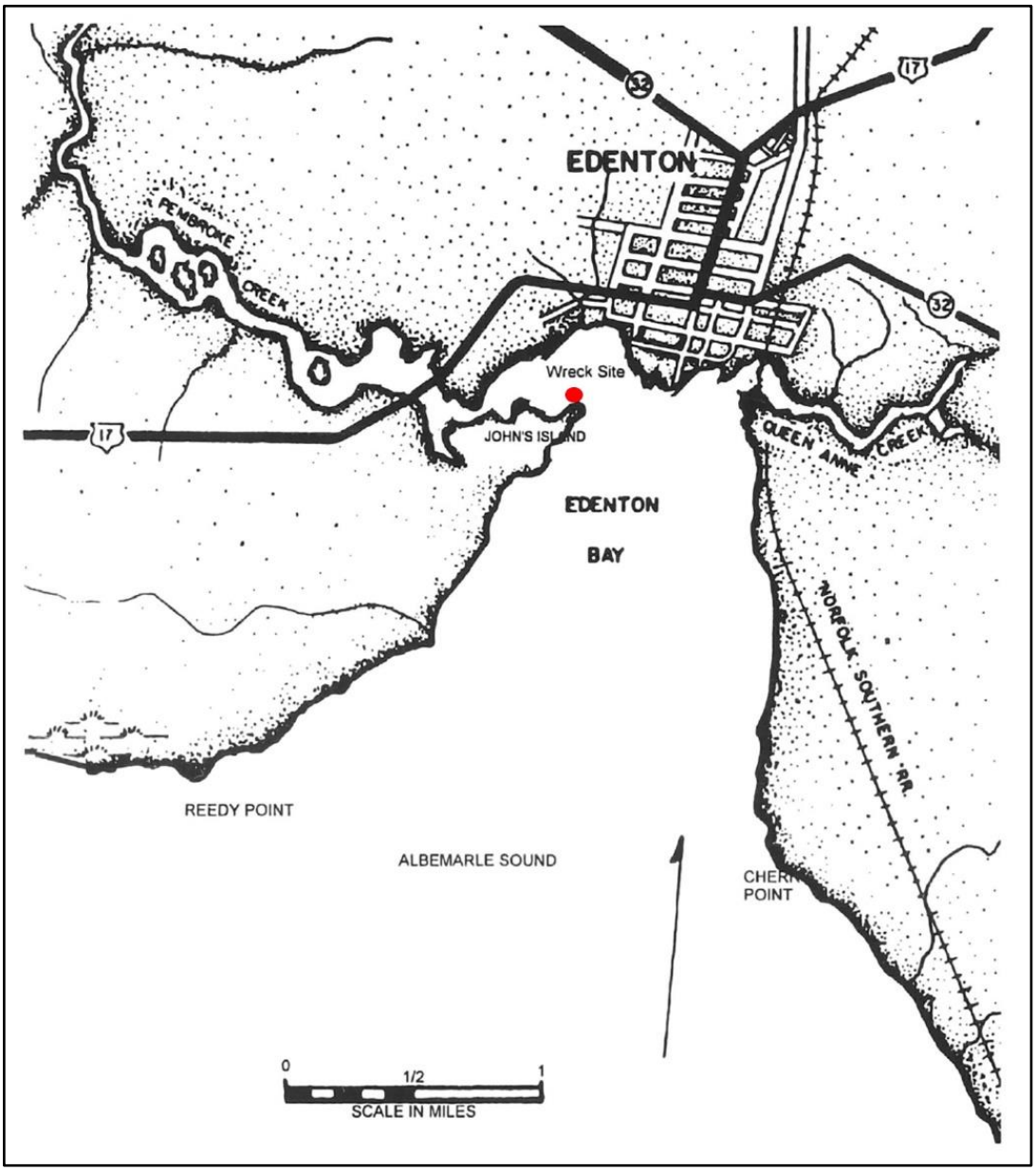

FIGURE 21: Map of Edenton Bay with the location for the John's Island Wreck marked in red (adapted from Watts 1981:23).

The 1980 investigation determined the overall length of the keel on the John's Island Wreck as measuring 31 m (101 ft) in length. Limited excavations conducted along the keel included the retrieval of some loose timbers and several artifacts that aided in dating the vessel's remains. With the assistance of 12 ECU graduate students, Watts and Lawrence created a magnetic contour map of the site using data collected from a proton precession magnetometer

survey. They also undertook physical documentation of the site, running a baseline between temporary datum points. The wreck was then mapped using 90° baseline offsets from which a site plan was created (FIGURE 22) (Watts 1981:19).

Minimal structural data from the 1980 project exists, with a single unscaled drawing of an unidentified bow futtock listing a measurement of 1.47 m (4.8 ft) in length. A wood sample taken from inner hull planking indicated that the vessel was too riddled with shipworm infestation to determine the species (Watts and Lawrence 1980:9). Data resulting from the 1980 investigation suggested the wreck dated to the third quarter of the 18th century and noted evidence of both salvage and burning the vessel to the waterline (Watts and Lawrence 1980; Watts 1981). Burning was a common practice for derelict vessels at the time since it allowed for easy removal of most of the iron fastenings and other (Watts 1981:19).

Although the 1980 harbor survey did not include full site excavation, it resulted in the documentation of features at the John's Island Wreck such as a large saddle mast step near the bow and a brick rubble pile located just aft of it. The rubble pile was originally interpreted as marketable ballast (Watts 1981:11; Frey 2009:508). Saddle mast steps consist of either a single mortised wooden block, or an assembly of blocks around a central mortise, mounted across the rider keelson. Such assemblies allowed sailors to adjust the rake (angle) of the mast and in some vessels the position of the mast along the keel (Steffy 1994:275; Vanhorn 2004:193-196). The presence of three mast steps (including the saddle mast step), iron shot, and possibly marketable ballast all contributed to the 1980 interpretation of the John's Island Wreck as being a large, ocean-going cargo ship.

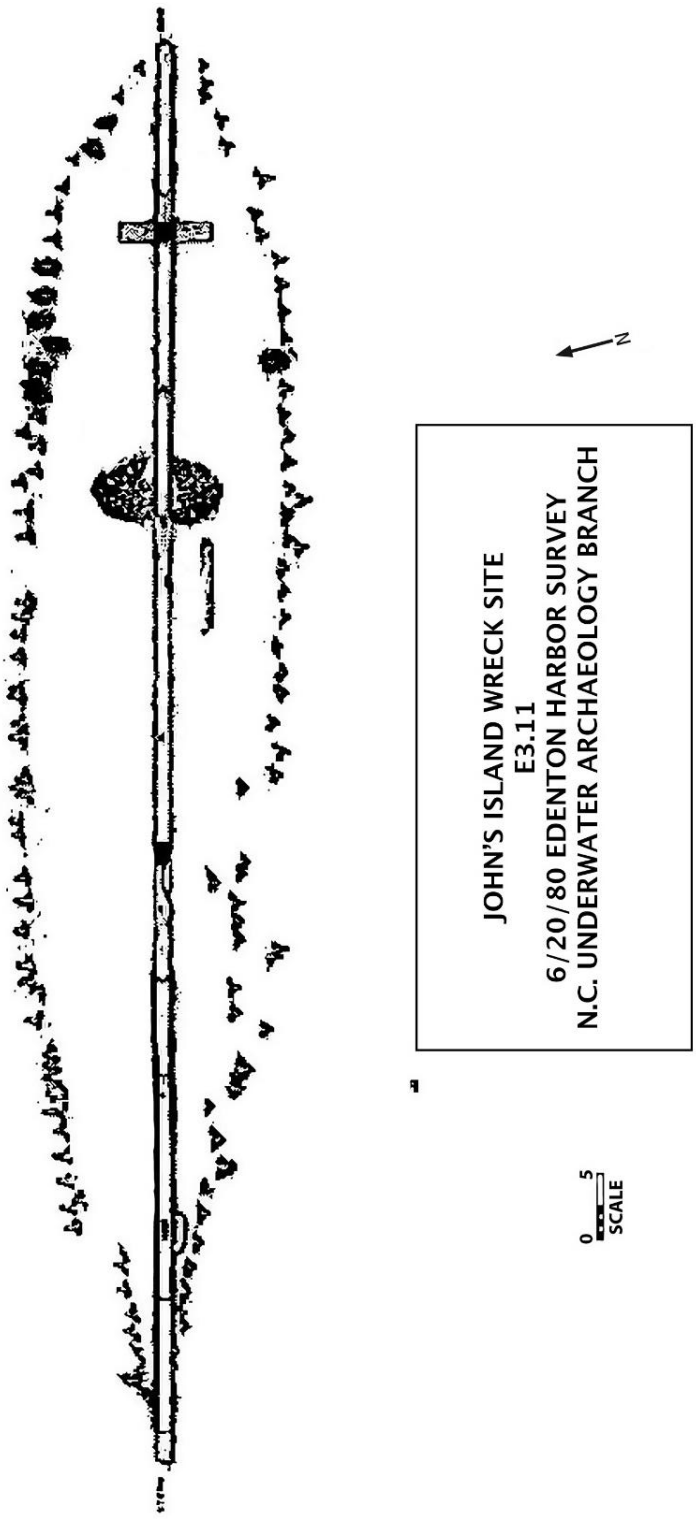

FIGURE 22: John's Island Wreck 1980 site plan; note scale is measured in feet (Watts and Lawrence 1980).

Several additional artifacts were recovered and documented from the site including a colonial period tea caddy, several iron shot, 18th century bricks, and barrel staves (APPENDIX A) (Watts and Lawrence 1980:39). Those artifacts, in addition to the presence of both wrought iron and wooden fastenings, were instrumental in dating the vessel (Watts and Lawrence 1980:11). Also recovered from the site were three shipwreck timbers, two futtocks (one previously described above), and a knee. For curation and storage, the North Carolina Department of Cultural Resources UAU took custody of the recovered materials and placed several on display at Fort Fisher State Historic Site (Watts 1981).

Although the 1980 Edenton survey was large in scope, the identity of the John's Island Wreck was never officially established (Watts 1981). Local tradition long considered the wreck to be the remains of *Holy Heart of Jesus*, a possibility that Watts alluded to in the report of investigations and a subsequent article (Watts and Lawrence:1980:11; Watts 1981:20). Interestingly, the 1981 article noted the keel measured for the wreck as 31.4 m (103 ft) in length (Watts 1981:19). However, notes in the UAB Site File suggest the vessel exceeded 38.1 m (125 ft) in length and had a beam exceeding 8.5 m (28 ft) (Watts and Lawrence 1980:9). It is possibility that John's Island Wreck could be the remains of *Holy Heart of Jesus* led the researchers to forgo considerations of other historical candidates.

4.1.2. John's Island Wreck Investigation 1993

Since local tradition held that *Holy Heart of Jesus* lay in Edenton Harbor and the data recorded in 1980 offered circumstantial support, associations between the John's Island Wreck and the cannon smuggling ship remained through the next decade. In 1993, a site investigation led by Dr. Bradley Rodgers and Dr. Lawrence Babits from ECU's Program in Maritime Studies was conducted as part of a summer field school. The primary objective for the course was

completion of a site plan that included greater detail than the one produced during the 1980 survey. It was hoped that through this process the vessel's age, function, and origin may be more accurately determined (Neidinger 2000). As in 1980, the 1993 project did not seriously consider any other identity for the wreck and instead investigated the remains as those of a transatlantic cargo ship. A master's thesis resulting from the 1993 project served as the project's report of investigations. The thesis focused primarily on an identity narrative of *Holy Heart of Jesus*, a decision which saw some aspects of collected structural evidence not seriously considered (Neidinger 2000).

During the 1993 field school, the wreck was excavated at the most diagnostic areas: bow, midship, stern, and along the centerline of the vessel (Neidinger 2000:55). Like the 1980 investigation, the 1993 field school used 90° baseline offsets to map the wreck. Progress was slow as visibility on site ranged from 70 cm (27.5 in) to less than 5 cm (1.9 in). To offset disadvantages created by poor visibility, crew members were split into three teams, each assigned a specific area of the site, with the expectation that area familiarity could expedite excavation and mapping operations. Once teams were assigned, three trenches were dredged at the bow, midship, and stern sections on the port side of the vessel to allow structural measurements to be taken (APPENDIX B).

Both the 1980 and 1993 investigations noted that only the lower 20% of the vessel's hull remained, thus the remains proved less intact than they were in 1980. The 1993 investigation notes indicate significant degradation occurred in the bow section (FIGURE 23) (Neidinger 2000:60, 73). The excavation produced a large volume of material and artifacts which helped solidify the original assessment as an 18th century vessel. In addition to recovered materials, the 1993 excavation recorded structural features of the John's Island Wreck. Investigators

documented the presence of wrought iron and wooden fasteners which were commonly used in 18th century vessel construction. A multi-component rider keelson and saddle block mast step were documented, as was the vessel's framing, which was described as single frame construction (Neidinger 2000:77). Finally, the vessel's stern assembly was recorded. All documented features further supported interpretations of the wreck dating to the 18th century.

Several wood samples recovered from the John's Island Wreck in 1993 were sent to the US Department of Agriculture's Forest Products Analysis Laboratory (APPENDIX C). The Wood Identification Research Center determined the samples from the recovered ship's knee were live oak (*Quercus virginiana*) and those taken from the hull planking, ceiling planking, first and second futtocks were southern yellow pine (*Pinus* sp.) (Newsom 1994). White oak (*Quercus alba*) was used to construct the floors, keelson, saddle mast step, and sternpost (Neidinger 2000:78-84), while the keel was made from red oak (*Quercus rubra*). Each species used in the vessel's construction is native to eastern North America and was frequently used in American shipbuilding during the second half of the 18th century (Naylor 1993:2; Newsom 1994).

The data collected through the 1993 project found some discrepancies in the 1980 assessment, namely a smaller estimation of size was measured in 1993. The 1993 project report stated the total length of the wreckage as 32.2 m (105.8 ft) and estimated a slightly shorter keel length of 29-31 m (95-100 ft) and a beam of 6 m (20 ft). In addition to the adjustment of potential size for the vessel, the brick rubble pile was reinterpreted as the remains of the galley rather than a cargo of marketable ballast (Neidinger 2000:63). The 1993 excavation and investigation resulted in a thesis, which articulated the possibility that the remains were those of *Holy Heart of Jesus* (Neidinger 2000). While the thesis never stated that John's Island Wreck represented *Holy Heart of Jesus*, no other vessel types or identities were seriously considered.

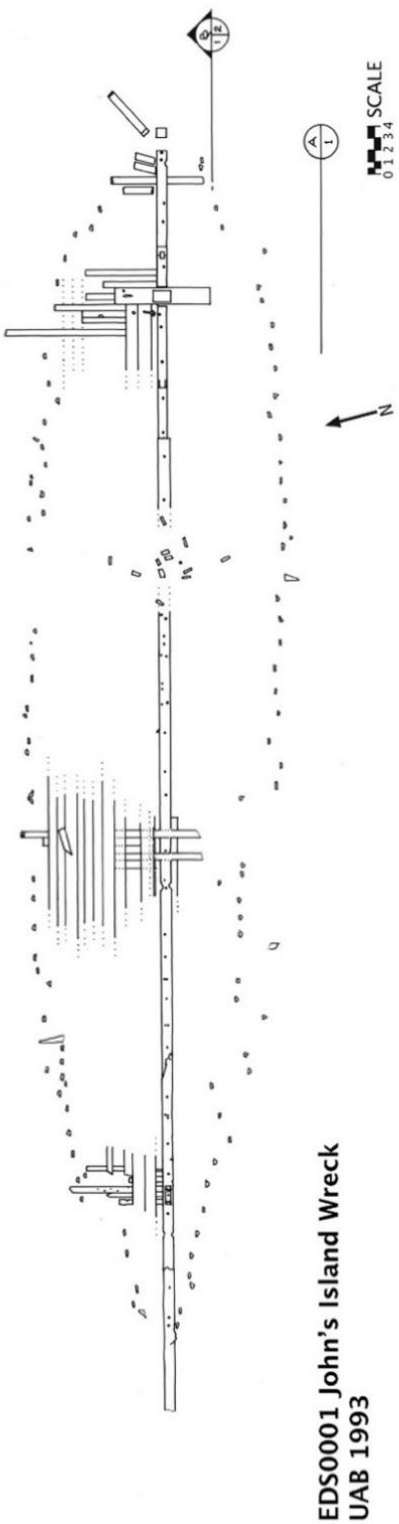

FIGURE 23: John's Island Wreck 1993 site plan; note scale is measured in feet (Neidinger 2000).

4.1.3. Historical Investigation 2008

More recent historical research conducted by Dr. Lawrence Babits and Joshua Howard (2008) provided a different interpretation for the John's Island Wreck. In their article "Our Captain Quinn? North Carolina's Benedict Arnold," Babits and Howard (2008:14) presented the history of a Revolutionary War raid on Edenton carried out by a row galley named *General Arnold* and captained by Continental turncoat Michael Quinn.

During the summer of 1781, Quinn was a menace, raiding throughout the western Albermarle Sound, burning plantation buildings and stealing cattle. When he attacked Edenton in May, he stole or destroyed large quantities of local resources, as well as burned homes and vessels (Goodall 2003:1-2). Quinn's attack on the town proved his undoing, as the townspeople outfitted a small group of locally owned vessels to chase him and reclaim the stolen property (Lamb 1781). Quinn and some of his crew were captured while at anchor in a marsh, and the galley was brought back to Edenton. Although the fate of *General Arnold* is uncertain, it was rumored to have been converted into communal property, used as a privateer, or shared by Edenton's merchants (Babits and Howard 2008:20).

Based on Babits and Howard's research into Michael Quinn, as well as archaeological evidence from the previous shipwreck investigations, a new interpretation for the vessel type and historical identity of the John's Island Wreck was considered. With this revised interpretation in mind, archaeologists from ECU's Program in Maritime Studies revisited the site as part of the 2024 field school. The goals for the site investigation were to assess the structural remains of the vessel and produce a detailed site plan of currently exposed features. Using both legacy and newly collected data, the remains of the John's Island Wreck were assessed to determine whether they represented a large row galley.

4.2. John's Island Wreck Investigation 2024

In May of 2024, faculty and graduate students with ECU's Program in Maritime Studies again recorded the remains of the John's Island Wreck. Prior to the investigation, ECU archaeologists met with Dr. Gordon Watts to relocate the site because coordinates from the 1993 project were inaccurate. In the approximate area, a hull mounted Hummingbird side imaging sonar was employed to relocate the wreck; once identified, updated GPS data was recorded before the stem and stern were buoyed in preparation for the field school.

Situated northeast of John's Island in 1.5 m (5 ft) of water, the John's Island Wreck lies submerged in a warm, active environment exposed to varying, but generally low salinity levels. The site is also exposed to prop wash, current from Pembrooke Creek, and daily tidal movement through Edenton Harbor. The wreck has been preserved thanks to the soft, dense muddy river bottom that covers its lower hull. It is, however, exposed to storms which pass through Edenton on a frequent basis during each hurricane season. Due to these environmental factors, the site has undergone dramatic change over the past 30 years.

Unlike previous projects focused on the John's Island Wreck, the 2024 field school priorities did not include excavation. Instead, the primary goals were assessing site conditions and producing a plan of all exposed timbers and any artifacts observed at the wreck. To expedite mapping operations, a baseline running 90°/270° (east/west) along the keelson was established between temporary datums installed at either end of the wreck. The site was divided into north side (port) and south side (starboard) sections, and each was further divided into six sections laterally, for a total of 12 sections spanning the wreck. On both port and starboard, five sections were spaced 5 m (16.4 ft) apart while a sixth section extended 6.8 m (22.3 ft), from 25 m (82 ft) to 31.8 m (104.3 ft) on the baseline. Student dive teams were split into six pairs with each assigned a section to map. Visibility was limited to between 20 cm (7.8 in) and 60 cm (23.6 in).

To maximize workspace and preserve underwater visibility, pairs were assigned to units alternating port and starboard along the baseline, leaving adjacent units empty. Initially students familiarized themselves with the site and the surrounding seabed by creating mud maps by conducting jackstay and circle searches. Although teams were arranged in a pattern designed to minimize sediment disturbance, after several minutes of work visibility each day diminished to zero.

A slight but persistent current pushed sediments eastward out of Pembroke Creek and contributed to the low visibility conditions. The current from Pembroke Creek brought varying amounts of downwash from upriver. Each day, the site accumulated sedimentation between 1 cm (< 1 in) to over 6 cm (2.3 in). The new deposits varied depending on weather conditions, with storms shifting large volumes of overburden on and off the site. For example, on the second day of the investigation, inclement weather kept teams out of the water. Despite losing a day of mapping, in return, the storm surge exposed large portions of the wreck which helped teams map previously unrecorded areas. While new ship material was exposed, some minor areas that were previously uncovered were reburied. To ensure site conditions remained serviceable for surface mapping, freshly buried features that had previously been exposed were lightly hand fanned, as allowed by the state permit (671 EDS 2024).

Wreck mapping by section was accomplished by taking 90° offset measurements from the baseline to central points of any exposed timbers, frames, and/or planking previously noted on mud maps. Teams recorded measurements for each section, then plotted them on graph paper to scale. The completed site plans from 1981 and 1993 served as guides and comparative references for the 2024 teams during the mapping process. By referring to the previous site plans, teams had visual references to specific elements which allowed for a better understanding

of changes that occurred in the 31 years since it was last mapped.

After nine days of mapping, field school staff and students successfully produced a detailed site plan of the John's Island Wreck (FIGURE 24). Twelve scaled section drawings were created and matched, then those were traced on velum before being scanned and digitally traced using Adobe Illustrator software. The resulting site plan complemented the 1981 and 1993 maps and confirmed interpretations that the wreck likely represents the remains of an American-built vessel dating to the second half of the 18th century (Watts 1981:20; Neidinger 2000:122).

4.2.1. Hull Analysis

During the 2024 site investigation, several days were spent analyzing the hull remains of the John's Island Wreck. The bow remains, prominently illustrated on the 1980 and 1993 site plans, changed significantly since 1993. Despite repeated searches, the starboard bow frames were not relocated. It was thought that the previously extant frames were buried since the bow appeared to list to starboard. As such, what remained of the bow section was restricted to the port side. Like prior interpretations, the extant portside frames showed evidence of the vessel having a rounded, or bluff, bow.

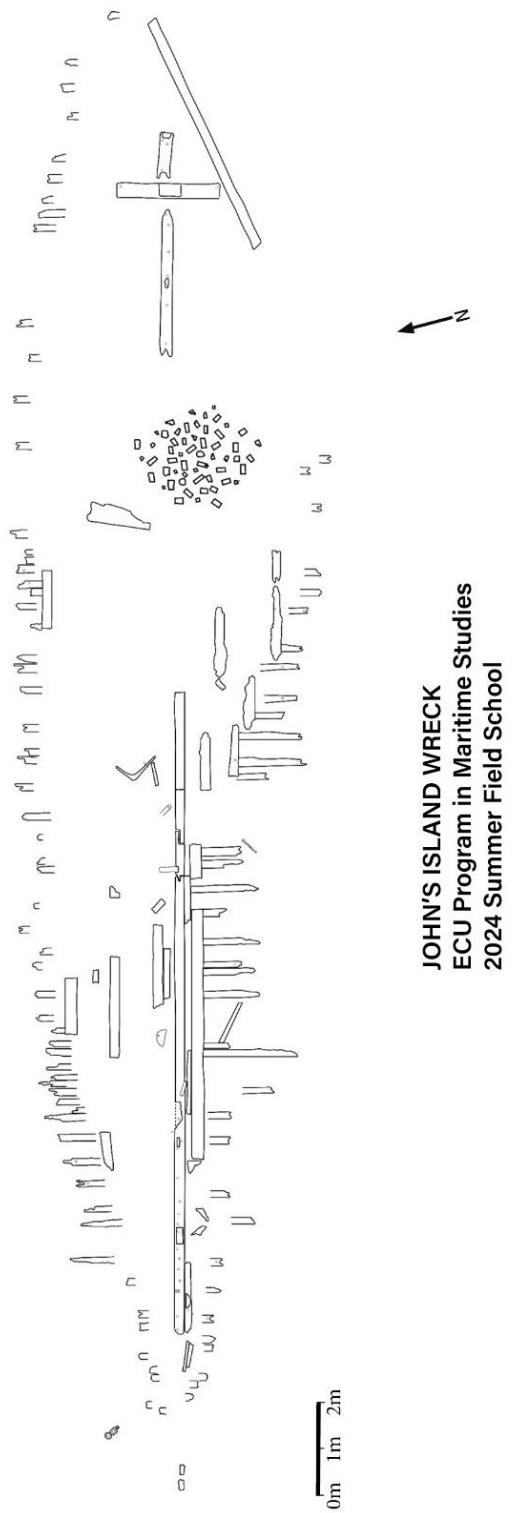

FIGURE 24: John's Island Wreck 2024 site plan; note scale is measured in meters (Program in Maritime Studies 2024).

Aft of the bow remains was a large saddle mast step which once supported a foremast. Saddle mast steps have been documented on other British colonial vessels dating to the mid-18th century, such as *Boscawan* and *Nancy (*Steffy 1994:180, 174; Sabick 2004:117). The saddle mast step was situated 4.5 m (14.7 ft) aft of the stem and was the only one of its kind found on site. Measuring 0.5 m (1.6 ft) molded by 2 m (6.6 ft) long, it was situated with the longer dimension running transverse across the keelson. It was fastened to the rider keelson by two iron fasteners which appear to pin the saddle to the keelson. Because the John's Island Wreck's saddle mast step was fixed in place, it was unlikely to have been adjustable and thus worked as a fixed mast-step (Steel 1794:11).

The keel was the most intact portion of the vessel; no material survives above the second futtock. The vessel structure tapered to a finer stern run aft. Throughout the length of the wreck, the keel was protected by a rider keelson which ran the length of the keel. A multicomponent assembly, the keelson was made up of several pieces of timber which were scarfed together and through-pinned to the keel by wrought iron drift pins to secure the assemblage. Multicomponent rider keelsons provided extra weight and structural reinforcement by strengthening the keel of the vessel to combat hogging and sagging. In total, four scarf joints were documented along the keelson of the wreck, three of which were grouped within 2 m (6.6 ft) of each other. The first was located at the 12.9 m (42.3 ft) point of the baseline and is a flat scarf (Steffy 1994:292). The second was at the 13.9 m (45.6 ft) mark on the baseline and is a step or hook scarf (Steffy 1994:292). And the last scarf joint in this grouping is located at the 15 m (49.2 ft) mark on the baseline and is a butt joint (or butt scarf) (Steffey 1994:292). No others were documented until the 22.7 m (74.4 ft) mark on the baseline, where the remains of another possible scarf joint were

documented. The multicomponent rider keelson had several timbers missing, potentially having been eroded away.

A small quantity and variety of ballast stones were also documented near the rubble pile. The largest concentration was located between 20 m (65.5 ft) and 25 m (82 ft) along the wreck's starboard side. Two primary types of ballast stones were present and one sample of each was recovered. The first type was smaller trap rock stones that included flecks of mica (ballast rock A), while the second consisted of larger rounded granite stones (ballast rock B). Both granite and trap rock (igneous rocks) were commonly used as ballast for ships throughout the 18th century (Garrison et al. 1989:70). Neither of these types of rocks are native to Edenton, which indicates that the vessel either traveled to other ports throughout its employment or employed recycled ballast.

The last artifact documented in the brick pile on the John's Island Wreck in 2024 was a piece of burnt wood, possibly charcoal, found at the 22 m (72.1 ft) point on the baseline. It is possible that this burnt wood is a remnant of the upper structure of John's Island Wreck and may be evidence which further corroborates the idea that the vessel was burnt during its salvage process. It is also possible that this piece of burnt wood is charcoal from the interior of the fire hearth or simply an intrusive object.

From bow to stern, the area of greatest exposure at the John's Island Wreck begins at the 17 m (55.7 ft) point on the starboard side and continues to stern. On this side of the wreck, floors, futtocks, and ceiling planks lie uncovered, exposed to bottom currents in Pembroke Creek and Edenton Bay. The absence of overburden covering the starboard side of the wreck aft of midship has resulted in significant degradation of structural materials. Unlike starboard, the port side appeared relatively intact due to overburden protecting the structure. No floor timbers were

exposed along portside midship, and only the ends of the second futtocks were visible above the river bottom.

Much of the portside remains were covered by a layer of mud, 20 cm (7.8 in) deep. The overburden did not cover the rider keelson which were exposed to currents. Along the rider keelson, two mast steps were observed. Those were a mortise step for the mizzen mast near the stern and the previously mentioned saddle block mast step present near the bow. Although recorded in both previous investigations, the mortise for the central step was not located in 2024 despite repeated attempts. The fact that two prior field projects recorded this feature indicates that it was unlikely to be a recording error. As such, the absence of the central step may be explained by damage along the keelson. Evidence suggests that sometime in the past 30 years the wreck suffered a severe structural break just forward of midship which caused the two halves of the vessel to list in opposing directions and warp the area where the break occurred. It is possible that post-1993 damage along the keelson destroyed the remnants of the main-mast step.

Noted in 1993 and again in 2024, the John's Island Wreck lacked copper sheathing or sacrificial hull planking. During the 2024 investigation, it was observed that the vessel's bottom hull profile was much flatter than expected on a vessel exceeding 31 m (101 ft) in length. Data collected in 1993 related to the hull profile at midship indicated a flat-bottomed hull design. FIGURE 25 presents a scale drawing of the midship profile, which aided in calculating the rough deadrise at midship, or the angular degree between the hull and the flat plane to either side of the keel (Steffy 1994:271).

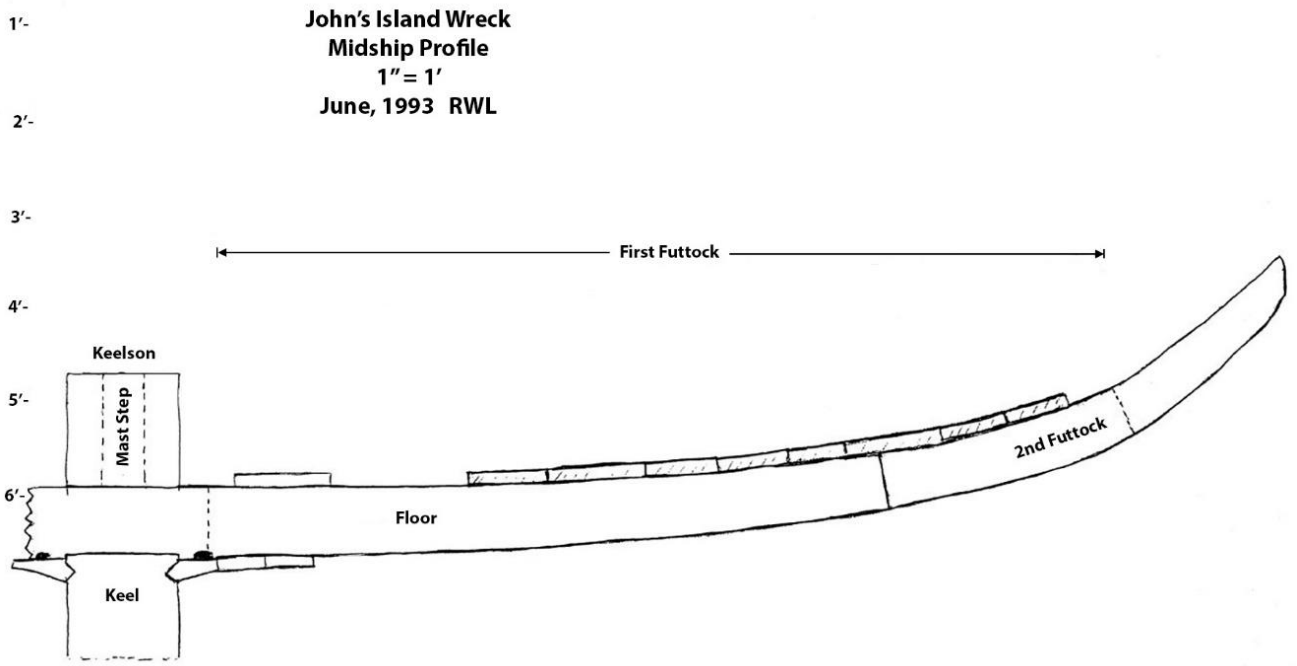

FIGURE 25: Midship profile for the John's Island Wreck recorded in 1993; note scale is measured in feet (Adapted from Lawrence 1993a).

A measurement of the midship deadrise on the John's Island Wreck established a relatively shallow angle of 17.35°. This is several degrees shallower than that noted for other vessels built for cargo hauling in British colonial contexts in 18th century North America. Specifically, the Continental brig *Defense* (1779), the Lake Champlain-built warship *Boscawen* (1759), and the Otter Creek Wreck (1772) (Jackson 1991:77; Chapman 2006:5262; Robinson 2018). A deadrise angle of 20° was estimated for *Defense*, while *Boscawen*'s was estimated at 22° (Robinson 2018:24). Although the Otter Creek Wreck's midship deadrise was never formally reported, a scale drawing of the vessel's midship section allowed for an estimate of roughly 25° (Jackson 1991:62). Lighter built American colonial merchant vessels seen in southern and Caribbean colonial contexts, such as the Rose Hill Wreck and Reader's Point Vessel, also have midship deadrise angles of less than 20° (Vanhorn 2004:89-90; Robinson

2018:24). The flatter bottoms of those southern watercraft fit within established vessel typologies common throughout the southern colonies, including coastal sloops and plantation boats. Plantation boats were a vessel type which originated out of older log-based rivercraft called periaguas. Built for use in shallow water, these craft usually had shallow deadrise, lacked hard design parameters, and were common throughout the Carolinas (Hocker 1992:12; Pecorelli 2003; Harris 2014).

The shallow deadrise angle of the John's Island Wreck suggests a flat-bottomed vessel of considerable length. Vessels with similar profiles may have been built for use specifically in the southern colonies where the shallow drafted, flat design was beneficial for navigating coastal and inland waters. Comparative assessments from data found in architectural treatises and contemporary wreck sites show consistent similarities in craft built for shallow coastal waters, namely flatter hull profiles and lower freeboards (Pecorelli 2003; Vanhorn 2004; Chapman 2006; Crisman 2014). This observation starkly contrasts the classic 'v' shaped hulls of vessels designed for deep-water use, such as HMS *Prince Regent* and HMS *St. Lawrence* (Steffy 1994:182; Moore 2014:192-193,195,198).

The flat bottom profile of the John's Island Wreck likely contributed to the degradation of the remains. As the vessel decayed and weakened, both port and starboard sides splayed out, with the majority of extant frames retaining first and second futtocks. Material loss began above the second futtock, thus lending support to the notion that the John's Island Wreck had a flat bottom profile. The 2024 assessment also included analysis of the framing style and pattern throughout midship, which proved highly informative. For such a long vessel, room and space on the John's Island Wreck were tight; spacing between floors in the bow averaged 12.7 cm (5 in), then widened at midship to an average of 40.6 cm (15.9 in). Curiously, one frame, located at the

mizzenmast step, was designed differently than the others, with a single first futtock laid directly against the keelson. The 1993 report contained an error regarding the framing, stating that the vessel utilized a single frame design in its construction (Neidinger 2000:74-75). This may have been interpreted as such due to the lack of horizontal (lateral) fasteners connecting the floors to futtocks, a trait shared with early 18th century single frame construction (Morris et al. 1995:125; Vanhorn 2004:76, 81, 131). The 2024 investigation found this statement unsupported by archaeological evidence, as most of the frames inspected were paired. Another notable characteristic of the framing relates to the fastening pattern. Throughout the bow section, futtocks were fastened forward of their respective floor timbers, that shifted at midship to futtocks being fastened aft of their respective floor timbers which remained consistent to the stern (Raupp et al. 2025). An alternating forward and aft futtock fastening pattern was a construction trait noted at other late 17th and 18th century colonial shipwreck sites, including the Port Royal Ship (late-17th century), the Bermuda collier wreck (mid-18th century), the collier brig *Betsy* (1772), and the British warship HMS *Charon* (1781) (Morris 1991:59; Vanhorn 2004:125-126, 141).

Despite the fastening conventions, the paired framing used for the John's Island Wreck was consistent with mid-18th century framing standards. Changes in 18th century framing were gradual but nonetheless existed as identifiable markers. Early 18th century double frames were defined as "a floor paired with the associated first futtock" (Steffy 1994:293, 278, 271; Morris et al. 1995:127-128). By the mid-18th century, double frames were similarly situated but fit closer together with less overall room and space. This style was documented in both the bow and stern of the John's Island Wreck and was observed on the mid-18th century Readers Point Wreck in Jamaica (FIGURE 26) (Morris et al. 1995:128).

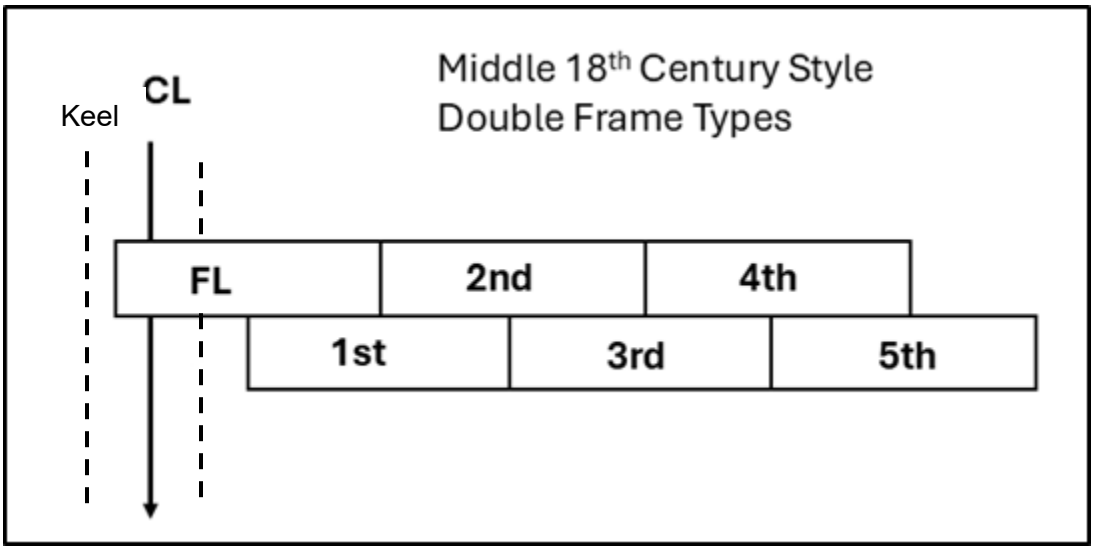

FIGURE 26: The double framing pattern of the Readers Point Wreck (1765) presented in plan view: CL represents the centerline of the vessel; dotted lines denote the extent of keel; FL indicates floor timber; and numbers represent consecutive futtocks (Adapted from Morris et al. 1995:128).

While excavating a trench at the stern of the John's Island Wreck in 1993, a single keel measurement was recorded at the stern as 10.1 cm (4 in) sided and 22.8 cm (9 in) molded. A keel of that size is likely to have experienced a high amount of stress when the vessel maneuvered in the water and was likely to have fragmented if it had traversed the Atlantic Ocean carrying a cargo of 45 cannon. Dedicated cargo hauling vessels dating to the Revolutionary War were generally built on keels with triple the widths of the John's Island Wreck. Two examples of this include the collier brig *Betsey* sunk at Yorktown, which had a keel measuring 36.6 cm (14.4 in) in width (Morris 1991:51), and a British collier located in Bermudad, which had a sided keel measurement exceeding 40.64 cm (16 in) in width (Watts and Krivor 1995:100). The keel of the John's Island Wreck is thinner than the above rider keelsons, a feature documented on other known 18th century vessels, such as *Defence* (1779), *Boscawen* (1759), the Rose Hill Wreck (1700-1760), and the Deadman's Island Wreck (1776-1781) (Vanhorn 2004:191-192). It is

important to note that the single measurement taken in 1993 could simply be the result of intentional tapering at the stern of the vessel. Tapering the keel worked to reduce material weight at the extremes of the vessel and could have reduced hogging and sagging in those areas (Pecorelli 2003:50, 78; Raupp and Babits 2025, elec. comm.).

The port section of the stern of the John's Island Wreck was excavated in 1993. The wreck tapered to a fine stern run where it joined the sternpost assembly. The sternpost was fitted with a false keel, or keel shoe. A false keel was a protective piece of wood, nailed to the bottom of the keel and acted to shield the brunt of any impact. False keels helped ensure the vessel's structural integrity and were common on 18th century British colonial vessels (Steffy 1994:271; Vanhorn 2004:59, 74, 108, 126, 141). The vessel's sternpost was raked 71° (FIGURE 27) and fitted to it was the remainder of the lowest iron gudgeon (of possibly three or more) that supported the rudder. The presence of the gudgeon indicates that John's Island Wreck may have utilized sails as a laterally swinging rudder, hung by gudgeons and pintles were generally used by sailboats to maneuver.

Taking into consideration the stern assembly, the vessel's overall length being at least over 30.5 m (100 ft), three mast steps, and the mostly flat bottom, the vessel was likely to have been a large, flat-bottomed watercraft which employed sails. Because it is found in the shallow water of Edenton Harbor, it is likely to have also been outfitted with sweeps which enabled it to penetrate upriver. As a large vessel that also relied on human propulsion to maneuver, the option of setting sail(s) was undoubtedly a welcome way to save a great deal of crew energy.

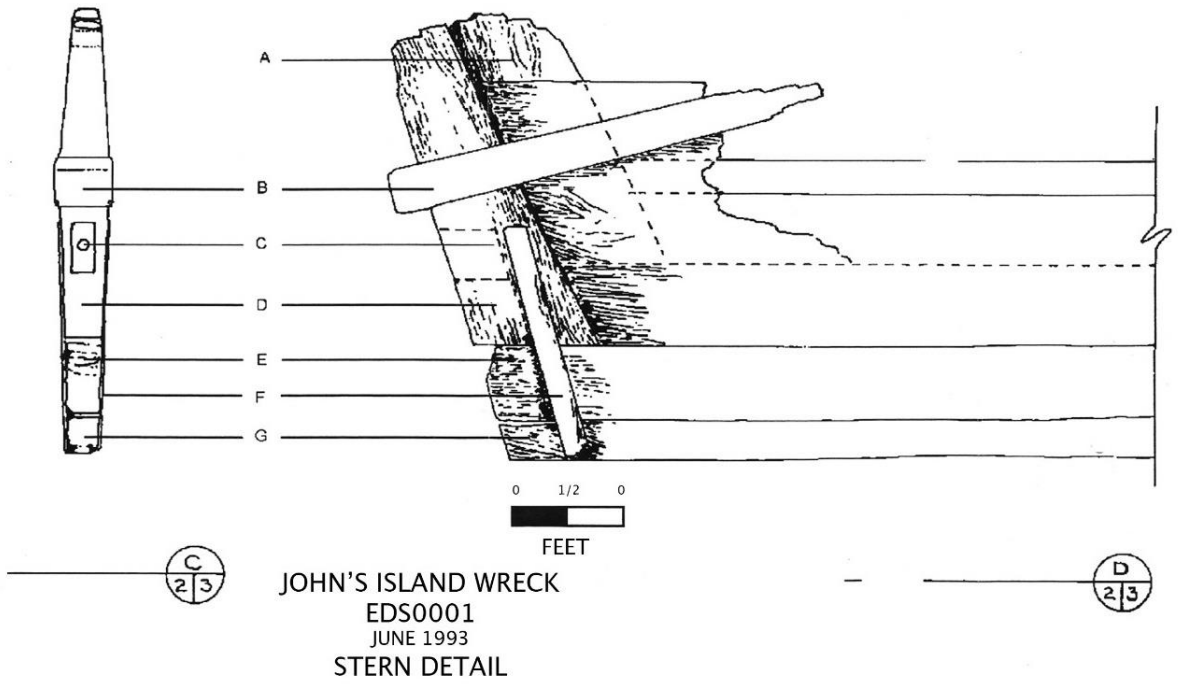

FIGURE 27: The stern profile of the John's Island Wreck recorded in 1993: A. inner knee; B. gudgeon strap; C. cavity with fastener; D. sternpost; E. keel; F. iron fishplate; G. keel-shoe (Bright 1993).

4.2.2. Artifact Analysis

Due to erosion previously noted, several diagnostic artifacts were exposed on the surface of the John's Island Wreck. Some artifacts were recovered for long term curation based on their assessed risk of destruction and their ability to aid site interpretation (APPENDIX D). Prior to artifact recovery, light hand fanning was employed to fully expose the artifacts and aid location mapping. All recovered artifacts were sketched in situ, mapped relative to the baseline, and GPS points were taken from the surface. Photographic recording was attempted in each case but generally failed due to the low visibility.

4.2.2.1. Cask Artifacts

From stern to midship along the portside, three separate pieces from the heads (ends) of wooden casks were recovered for analysis. Wooden casks developed into two types by the 18th

century: slack and tight. Slack casts were typically made from pine and designed to hold and transport general goods and materials that did not have to be kept in a watertight container. Goods such as fruit or cloth were often shipped in slack casks. Tight casks, often made of white oak, were used to store and transport goods and materials such as salted meats, spirits, and essential foodstuffs that required a watertight container. Tight casks were also used to keep moisture away from stored items such as black powder and parchment (Jackson 1991:190).

Two recovered cask parts were cant staves, and the third was a quarter head piece. A stave was a piece of wood, cut into "the appropriate lengths, widths and thicknesses" to then shape or "dress" the cut piece into desired forms (FIGURE 28) (Kilby 1971:20-21). The shaped piece of wood (stave) was then "listed," or, further whittled into shape by a cooper's axe to eventually make up the body of a barrel (Kilby 1971:21). A 'head' piece cant stave was semi-circular in shape, fitted into a groove called a croze that was cut into the top (head) of a cask, using a tool that was also called a croze (Kilby 1971:31). The recovered cant staves or 'heads' came in three variants, one type had no bung, or tap hole, and was designed to be the first piece which made up the head. It was positioned so that its wood grain ran against the grain on the opposing head thereby reducing tension on the cask (Kilby 1971:40). The second bung, or tap hole variant of top head cant, was installed last and a taphole was drilled into it, the third consisted of central components, referred to as a quarter head piece.

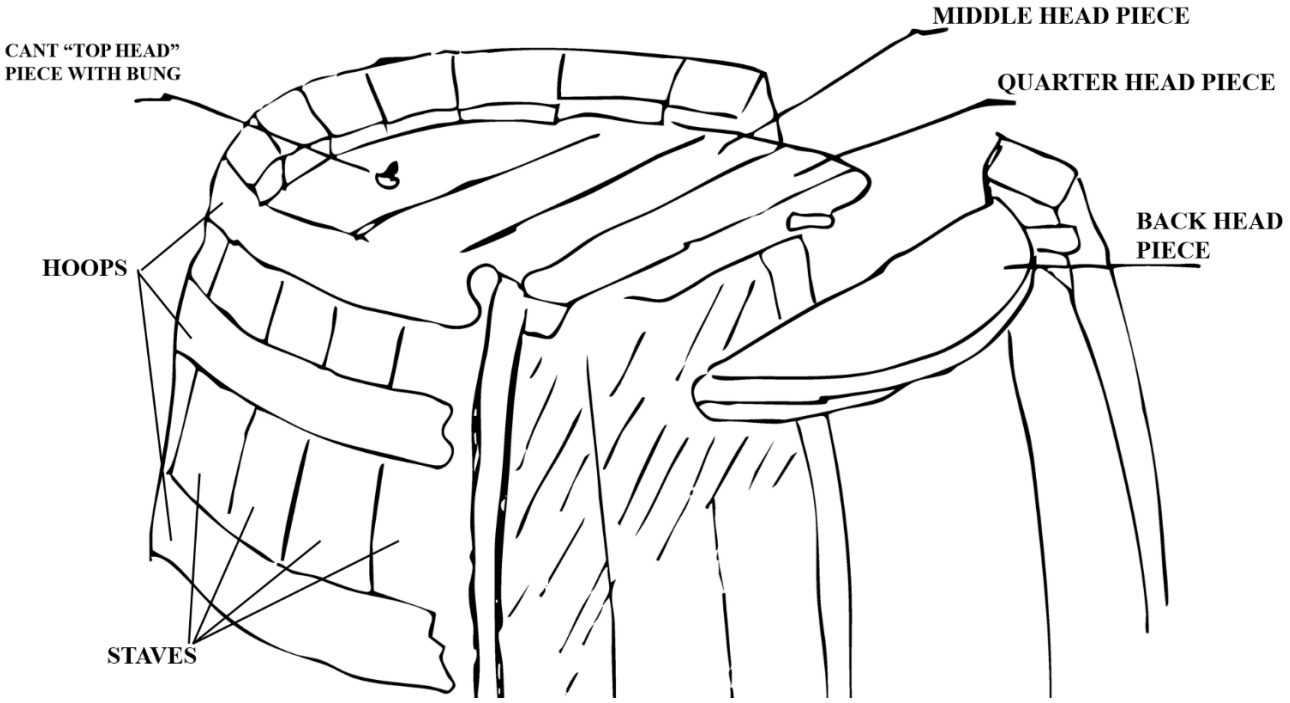

FIGURE 28: Artistic representation of wooden cask components, with some specific pieces marked (Adapted from Jackson 1991:197; Shackleford 1988).

Cask component A (FIGURE 29) was a back head stave measuring 26 cm (10.2 in) long and 7 cm (2.7 in) wide, which showed signs of tool marks along the back semi-circular section where the piece fits into the croze. The artifact's surface was smooth and likely planed to a finer finish. It also displayed faint evidence of markings, possibly remnants of an owner's brand. While the exact size of the original cask is not known, it was possible to get an estimate based on the size of the stave. Because it was quite small and thin, it likely came from a small waterproof, or 'tight' cask, probably no bigger than 40 liters (L) (10.5 gallons [gal]), with a circumference of 92 cm (36 in). Although wood sample analysis was not conducted, the type is most likely oak, a common wood for tight cask use (Kilby 1971:69-70).

FIGURE 29: Cask component A, back head piece, recovered from the John's Island Wreck (Program in Maritime Studies 2024).

Cask component B (FIGURE 30) was a top head cant, or bung-stave, used to seal the cask. It included a taphole that allowed the contents to be dispensed. The taphole was sealed shut with a circular piece of wood called a bung, which remained in situ (FIGURE 31). The artifact measured 41.9 cm (16.4 in) long and 22.5 cm (8.8 in) at its widest point. Tool markings noted along the left side suggest that it was shaved into shape. It was likely used in a medium sized cask, perhaps 100 L (26.4 gal) to 120 L (31.7 gal) in capacity and had a circumference of approximately 132 cm (52 in). No wood sample analysis was conducted but it was likely made from oak due to the appearance of grain, tool markings, and finish.

FIGURE 30: Cask component B, cant top head stave, with intact bung (Program in Maritime Studies 2024).

FIGURE 31: Cask component B, cant top head stave, with intact bung (Program in Maritime Studies 2024).

The last cask-related artifact recovered was cask component C (FIGURE 32). A central head piece, which fit between the outer head pieces, it measured 7 cm (2.7 in) wide and 25 cm (9.8 in) long. It displayed evidence of tool marks and shaving along the body, and had a fine finish, similar to cask component A and B. This artifact was also once part of a tight cask which had an estimated circumfence of 103.7 cm (40.8 in) and may have held between 50 L (13 gal) and 60 L (16 gal). Cask component C had intact evidence of a feathered joint, along its top left side. Feathered joints, or tongue joints, were a type of joining method which created a watertight

seal. The joint used a thin, tapered section (called the feather or tongue) which slid into a groove cut out on the associated piece. Once inserted into the groove, the joints worked to form a tight seal (Hasluck 1916:190). The presence of a partial feathered joint indicates that this quarter piece was used in a tight cask as feathered joints worked to seal in liquids or gun powder.

FIGURE 32: Cask component C, quarter head piece, recovered with feathered joint remains circled in red (Program in Maritime Studies 2024).

Dating cask staves is difficult as only slight changes occurred in coopering over time. Some chronological indicators exist, such as specific markings and construction material transitioning from wooden to iron cask hoops by the early 18th century (Jackson 1991:187-188). Prior to the use of iron barrel hoops, wooden hoops called *wythes*, or *withes*, were utilized (Kilby 1971:100; Twede 2005). Wooden hoops gradually fell out of style as superior hoops made of iron allowed for the construction of watertight casks which enabled a cheap way to transport liquid (Twede 2005:254). No cask hoops were noted at the John's Island Wreck site; design features of the documented cask pieces indicate that the head staves were all likely from tight casks. Tight casks had strict standards for construction, requiring high-quality wood, usually white oak but occasionally ash (*Fraxinus* sp.), gum (*Eucalyptus* sp.), or Douglas-fir (*Pseudotsuga menzeisii*) (Jackson 1991:193). Tight casks also had to be constructed in specific ways to ensure that they remained watertight. Of the recovered cask materials, cask component A exhibited evidence of brand marks. The presence of brand marks suggested that it may date to

the late 18th century as the branding of casks was mandated by law in North Carolina during that period. Coopers were threatened with a fine of six shillings eight pence for failing to brand their barrels at least as early as 1771 (NCGA 1771:796).

4.2.2.2. Brick

Approximately 4.5 m (14.8 ft) aft of the saddle mast step, a possible ballast pile was documented. The pile included an estimated 200-300 bricks visibly scattered across an area 2 m² (6.6 ft²), with more buried under sediment. Two distinct types of brick were documented in a rubble pile just forward of midship of the John's Island Wreck site and three samples were retrieved for analysis. The first type is a handmade red brick consistent with types and styles of brick observed in 18th century architecture throughout Edenton (Watts 1981:20; Neidinger 2000:61). American handmade bricks from the 18th century lacked uniformity in size and specific adherence to shape (Crews 2006; Kennedy 2021). In addition, handmade bricks do not display the sharp right-angled corners of modern bricks. Instead, bricks made by hand in 18th century America generally exhibit rounded corners, a feature caused by the wooden mold used to shape them (Meide 1994). Eighteenth century red brick was versatile and used to construct a wide range of structures from walls to fireplaces. The rounded corners were exacerbated by centuries of weathering processes.

Two red bricks were recovered from the site for analysis. Red brick A (FIGURE 33) showed signs of waterlogging and slight flaking, with some of its original surface eroded away. With a grit content of varying particle size, it measured 17 cm (6.6 in) long by 4 cm (1.5 in) wide and was not glazed. Red brick B (FIGURE 34) also showed signs of waterlogging, with cracking and pockmarking along its faces, and measured 17.5 cm (6.8 in) long and 5 cm (1.9 in) wide. During the 1980 site investigation, Watts noted that the red brick looked very similar to the red

brick observed locally throughout Edenton's 18th century architecture, an observation that was similarly noted through ECU's 2024 site investigation (Watts 1981; Raupp et al. 2025). Due to the high volume of red brick found throughout the area, it was possible that this might represent the remains of a marketable ballast pile.

FIGURE 33: Red brick A, recovered from the John's Island Wreck (Program in Maritime Studies 2024).

FIGURE 34: Red brick B, recovered from the John's Island Wreck (Program in Maritime Studies 2024).

The second brick type observed at the John's Island Wreck was identified as a Dutch paver or clinker brick. While several of this brick type were observed, it appeared less frequently than red bricks. To avoid disturbing the site further, only one specimen of clinker brick was

recovered. Clinker brick A had a fine grit consistency, is unglazed and measured 18 cm (7 in) long by 4.5 cm (1.7 in) wide (FIGURE 35). This brick type has been archaeologically documented in other 18th century sites along the east coast for use in fireplaces and fire-hearths (Watts and Lawrence 1980:11; Watts 1981:20; Luckenbach et al. 1994).

FIGURE 35: Dutch paver (clinker) brick A (Program in Maritime Studies 2024).

The volume and types of brick present and lack of mortar suggest three plausible explanations for the existence of the pile. The first is that the red bricks were added as ballast and permanently placed or were considered marketable and intended for sale at some point. Explanation two questions whether the clinker bricks were the remnants of the vessel's open hearth. Composed of Dutch paver or clinker brick, open hearths were used on the top weather deck of gunboats and galleys during the later 18th century (Luckenbach et al. 1994; Bratten 2002:190). It is feasible that deterioration of the deck caused the hearth to collapse into the cargo hold, where the red ballast bricks were situated. The third possible explanation is that both the red brick and the clinker brick were used to construct the hearth with the red brick acting as a base for the clinker brick, working to further insulate the deck.

The presence of a brick fire-hearth may offer some insights into the provenance of the John's Island Wreck. During the mid-18th century (1745-1755), British naval vessels

transitioned from brick hearths to iron stoves (Lavery 1987:190; Brenckle 2014), and by the time of the American Revolution that transition was all but complete. The presence of a brick fire-hearth thus indicates the John's Island Wreck is unassociated with official Royal Navy construction. Although not likely associated with the Royal Navy construction, the vessel's dimensions do align with the British Imperial measurement system, instead of the French or the Dutch systems of measurement (Babits 1993:2). This could be an indication that the vessel was associated with British colonial construction (Lavery 1987:190 -197).

4.2.2.3. Iron Artifacts

Two iron artifacts were recovered from the John's Island Wreck in 2024. The first was a drift pin measuring 63 cm (24.8 in) long and 3 cm (1.1 in) in diameter (FIGURE 36). The term "drift" refers to the differences in diameter between the pin and the hole in which it fits (Steffey 1994:270). This drift pin may have been used to fasten the rider keelson to the keel, thus sandwiching the assembly together. Since threaded screws were not commonly used in ship construction until machining technologies introduced them in the 19th century, earlier drift pins were secured in two different ways (Steffey 1994:270). For the first method, pins (or nails) used to fasten non-essential structural components had their ends clenched, or bent, to create a hook which functioned like a barb, catching the side of the material into which they were driven. In the other method, drift pins were designed with flat, broad heads and diameters slightly larger than the hole in which they were to be installed. This design resulted in a secure, watertight fastening and was preferred for holding the keel assembly together by the late 18th century (Jackson 1991:69; Clifford 1993:84; Steffy 1994:288-289; Morris et al. 1995).

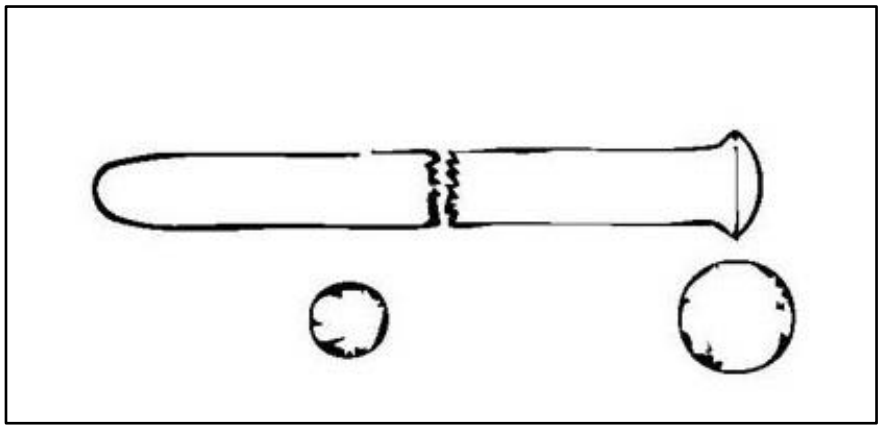

FIGURE 36: Artistic interpretation of a drift pin, middle is absent to show variability in object length (Adapted from Steffy 1994:289).

The second iron artifact recovered from the John's Island Wreck is a mast cap (FIGURE 37), measuring 38.1 cm (15 in) long by 13 cm (5.1 in) wide. The diameter of its left halyard eye is 3 cm (1.1 in), and the diameter of its right circular component is 9 cm (3.5 in). Mast caps were staples on lofty ships and typically used to secure the tops of mainmasts, attach secondary masts or flagpoles, and support rigging of various types. In addition to securing masts, mast caps could also be used to secure multicomponent bowsprits and rigging. Mast caps of varying size were made of both wood and metal, and by the 18th century iron mast caps were increasingly common (Underhill 1972:72, 80, 88). They were versatile objects, with the wooden variants able to be modified by adding iron halyard eyes as needed. Iron mast caps, on the other hand, were not as easily changed and were therefore usually purpose built and unlikely to be used in a secondary manner (Biddlecombe 1969:65, 78, 91-92; Underhill 1972:38-39, 88-89; Passaro 2009).

FIGURE 37: Iron mast cap recovered from the John's Island Wreck in 2024 (Program in Maritime Studies 2024).

Mast caps were shaped depending upon their use. Since 18th century masts were not uniform in shape, some possessed octagonal, square, and/or rounded portions. Mast caps with square openings were generally placed along the upper part of a mast (Biddlecombe 1969:65,78). Such caps occasionally had halyard eyes positioned forward, facing the bow and/or laterally, on the port and starboard sides (Underhill 1972:60, 63, 64). Instead of being positioned horizontally to fit over the mast, a bowsprit mast cap might have been installed vertically to secure the jibboom to the end of the sprit (Biddlecombe 1969:4, 62).

The mast cap recovered from the John's Island Wreck was found near stern on the port side of the vessel. As described above, it included a horizontal, aft facing halyard eye. This may have allowed for the rigging of a triatic stay, which was a line running horizontally between the main, mizzen, and jigger mast caps. Not intended to directly support a sail, triatic stays were used between the fore and main masts to provide the upper masts with structural support (Underhill 1972:100-101). Because the mast cap recovered from the site was found in the port stern near the mizzenmast step, the aft lateral halyard eye may have supported a sail. The presence of an aft facing halyard eye has been observed throughout lateen rigged vessels and

among vessels sporting a full ship's rig, where a lateral, aft facing halyard eye was used to rig a lateen mizzen, spanker, or gaff sail (Biddlecombe 1969:65, 69; Allan 2022; NHHC 2023).

4.3. Notable Changes to the John's Island Wreck

The 2024 investigation of the John's Island Wreck documented significant changes that had occurred since the 1980 and 1993 investigations. To better understand the change over time, each site plan was color coded, and an overlay made using all three plans (FIGURE 38). The resulting figures are useful as they show the remains documented in each investigation and the changes that occurred over the years. Since 1993, Edenton experienced several storms – including a Category 2 hurricane that caused catastrophic flooding throughout the Outer Banks in 2019. Beyond causing damage to public and private properties, the storm surge resulting from the hurricanes was likely responsible for the more extreme changes that occurred at the site (Riggs et al. 2011:2, 24-25, 27). One such change was the deposition of organic detritus on the site, including three large wooden objects embedded within the wreck. The first consisted of a 5 m (16.4 ft) long pylon which may have supported a marker used to denote the boundary of a channel. It was likely displaced by storm surge and eventually deposited across the bow of site. Two other intrusive logs were documented: an unmeasured small log lying between the 8 m (26.2 ft) and 13 m (42.7 ft) baseline marks on the portside and a final, unmeasured log buried portside at the 20.5 m (67.3 ft) point on the baseline.

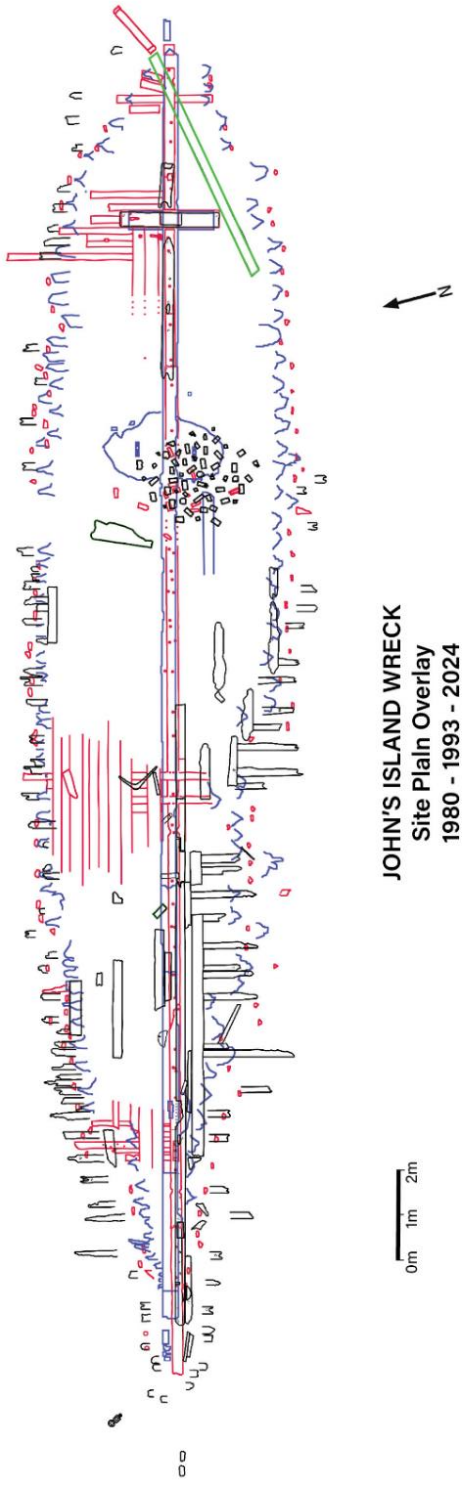

FIGURE 38: 1980 (blue), 1993 (red), and 2024 (black) site plans overlayed to illustrate change over time; note the intrusive objects observed in 2024 highlighted in green. The plans appear offset aft of midship, illustrating the amount of movement the vessel has experienced.

In addition to intrusive materials, several structural variances from both the 1981 and 1993 site plans were observed in 2024. The previous site plans clearly indicated the forward-most exposed section of the rider keelson was attached to the saddle mast step. Since 1993, however, that section of the rider keelson became disarticulated from the saddle mast step, leaving a 40 cm (15.7 in) gap. Another structural change observed in 2024 was a significant break along the rider keelson running through the keel at 17 m (55.8 ft) along the baseline. From that point to the stern, the break caused the vessel to list slightly to port, and from the break to the bow, the vessel now lists slightly to starboard. The resulting list has buried all frames along the starboard bow section up to 21.5 m (70.5 ft) on the baseline, while the port side list exposed the vessels once preserved starboard structure to subsurface currents. Other structural changes were noted along the rider keelson, and at the bow frame ends on the port side. For instance, although both the 1981 and 1993 site plans depicted a substantial number of frame ends exposed in that area, the 2024 investigation documented no frames there. Low visibility in that particular area of the wreck made multiple attempts to relocate the frame ends along the starboard bow unsuccessful as such they were determined to be buried.

It is likely that exposure to subsurface currents contributed to erosion of firm sediments that once buried the site. As stated above, another erosional factor was storm surge which intermittently exposed many frames and ceiling planking along the first 17 m (55.8 ft) of the site. Due to erosion in that section, the potential for damage resulting in the loss of currently documented features should be noted. The vessel's list in two different directions put great stress on the keel assembly, which caused scarf joints along the keelson to separate and further contributed to overall structural deterioration.

Edenton Harbor is an active region that experiences occasional strong currents and the effects of storms. Natural forces have long impacted infrastructure and people throughout the Albemarle area. As such, the harbor bottom was subject of periodic and intense silting episodes. In 1795, for example, two hurricanes swept through the area, depositing so much silt that tall ships were unable to enter Edenton (Medlin 2023). The harbor also clearly underwent dramatic change in the first decades of the 21st century. In 2000, Neidinger reported that the John's Island Wreck sat in depths varying from 1.5 m (4.9 ft) to 2.7 m (8.9 ft) of water (Neidinger 2000:1). Since 1993, the topography of the seabed changed drastically, resulting in depths recorded 1 m (3.3 ft) shallower in 2024 than the maximum recorded in 1993. Thus, the combination of storm surge and sediment deposition caused substantial accretion over the last 31 years (NOAA 2024). As previously noted, the wreck experienced significant erosion over its first 17 m (55.8 ft). Due to the list to port, frame ends, ceiling timbers, and sections of the keelson had overburden sediment swept away by the current from Pembroke Creek, which exposed artifacts such as barrel staves. The break in the keelson assembly will likely further contribute to site change over time, as the vessel resettles on the harbor-bottom.

Conclusion

Given the historical significance of the John's Island Wreck, two archaeological investigations were undertaken in the 20th century with the goal of better understanding the site. Townsfolk in Edenton long associated the wreck with the legendary Revolutionary War-era gun running cargo ship *Holy Heart of Jesus.* Due to the significance of a potential relationship between the wreck and *Holy Heart of Jesus*, prior archaeological investigations did not seriously consider alternate ship types or identities for the remains. Questions regarding the associated identity of the John's Island Wreck promoted a renewed interest in the site, leading to another

investigation in the summer of 2024. Resulting data from the 2024 investigation was compared with that collected through the previous projects and other 18th-century archaeological sites, which revealed new insights about the vessel's potential type. Recently available archival materials provided further support for this updated interpretation and allowed for the consideration of other historical candidates for the identity of the John's Island Wreck

Chapter 5: Discussion

Recent archaeological and historical research revealed a multitude of data pertaining to the John's Island Wreck. The gathered data called into question prior historical interpretations for the wreck and provided insight about lingering inconsistencies from the historical record. In addition to historical findings, a series of archaeological observations led researchers to the conclusion that the vessel's construction differed from previous interpretations. This chapter considers all information presented thus far and presents a discussion of data pertaining to the history of various interpretations behind the John's Island Wreck site.

5.1. Historical Data and *Holy Heart of Jesus*

Recent historical research unearthed more information about William Borritz and the vessels he owned. Thanks in part to NC's digitization of historical records and documentation provided by the state's Office of Archives and History digital publication branch, MosaicNC, a recently identified document dating to 1777 lists Justices of the Peace swearing allegiance, including William Borritz (SANC 1777). This document was signed one year before Borritz made the legendary cannon delivery to Edenton in 1778 (Neidinger 2000:37). Data related to his business and social relations in the town strongly indicate a vested interest in the success of the American colony's rebellion against Great Britain. Thus, it may not have been an accident that Borritz found himself in Edenton, as previously posited (Wilcox 1986:131-132; Neidinger 2000:36-37).

As stated previously, Borritz referred to *Holy Heart of Jesus* as a "ship" on numerous occasions. As such, the vessel was likely three masted and rigged with square sails (Borritz 1780, 1782). Despite the clue to the possible rigging of the vessel, however, questions remain about the identity of *Holy Heart of Jesus*. For instance, it is still unknown when Borritz parted with the

vessel. In 1780, he petitioned the General Assembly and introduced himself as "William Borritz, master and commander of the ship formerly called the *Holy Heart of Jesus,* now the *Fair American…"* (Borritz 1780). After having not been paid, he petitioned the General Assembly again in March of 1782, introducing himself as "Formerly master and commander…" (Borritz 1782). His 1782 petition included the first use of the word "formerly" either smudged or struck out. If struck out, it indicates that he still owned *Fair American* at the time of writing. If smudged, it may indicate that Borritz no longer possessed *Holy Heart of Jesus* by March of 1782. If the latter is the case, the ship's connection to Edenton diminishes as the vessel's name changed from *Holy Heart of Jesus* to *Fair American*, indicating that it was unlikely to ever reappear under its old name in the town. Further research indicated that it was not the privateer vessel *Fair American*, which included four Edenton merchants as partial owners and which was lost in 1780 (Neidinger 2000:44).

If the word "formerly" is not struck and just smudged, and Borritz claims to have been the Master and Commander of *Fair American* in 1782, it is possible that he is not being entirely truthful. Edenton resident James Iredell refers to "Mr. Borritz's boat" in a letter written to his sister in 1781, in which he discussed Edenton merchants outfitting a number of watercraft to exact revenge upon British raiders who attacked the town (Higginbotham 1976:251-252). In the 18th century, the term 'boat' was used to refer to a variety of small watercraft (Steffy 1994:268). Thus, it is more likely that Iredell's reference to a boat does not refer to a ship-rigged vessel (Higginbotham 1976:251-252). Iredell's word choice is interesting because he makes no reference to *Fair American,* likely a large ship and valuable addition to any offensive water action. It may instead refer to Borritz's small schooner *John*, possible evidence that *Holy Heart of Jesus*/*Fair American* left Edenton by this point, either through private sale or wrecking

(Wiggins 1944; Neidinger 2000:52).

Of the documents which discuss the fate of *Holy Heart of Jesus,* only secondary sources were found. From those, only one author, Edenton resident and North Carolina historian Jasper L. Wiggins, consistently stated that *Holy Heart of Jesus* was scuttled in Edenton over 100 years after the event (Wiggins 1944:5; 1949:7; 1954:7). Each time Wiggins referenced *Holy Heart of Jesus,* he repeatedly stated that the vessel was scuttled up Pembroke Creek, where the U.S. Fish Hatchery was located. The Fish Hatchery was situated just under one kilometer (half a mile) up Pembroke Creek from the location of the John's Island Wreck, putting further doubt on the association between *Holy Heart of Jesus* and the John's Island Wreck (Wiggins 1944:5; 1949:7; 1954:7).

In addition to the unknown fate of *Fair American*/*Holy Heart of Jesus*, the size of the vessel was also unknown. A formula referred to as the "builder's old measurement" or "builder's tonnage" was the standard for calculating the tonnage of merchant vessels during the later part of the 18th century (Steel 1805:249; Goldenberg 1976:4-5; Morris 1991:50). Although it was the standard, this formula[1] was not very accurate for calculating a vessel's true total cargo capacity. To correct for the (estimated) cargo capacity of a vessel in the 18th century, an additional 1/3rd of the measured tonnage was added (Goldenberg 1976:4). Based on the extra weight, the estimated tonnage of the John's Island Wreck was established at 250 tons. The estimated minimum tonnage of *Holy Heart of Jesus* was also established using details from the Rey and Brandenbourg contract (1777) and the "builder's tonnage" formula. The resulting estimated minimum tonnage suggested that a vessel of at least 130 tons burden was required to

[1] Tonnage = $\frac{(\text{Length of keel} - 3/5\ \text{Length of Beam}) \times \text{Length of Beam} \times \text{Length of Beam}}{2}$

successfully carry a cargo of 45 cannon across the ocean (Wilcox 1986:131-132).

North Carolina's earliest state port records definitively tie Borritz and his family to ownership of two merchant vessels at Edenton after the Revolutionary War, a 200-ton ship named *Queen of France* and a 60-ton schooner named *John* (NCOSA 2024:7138, 7192, 7212). After *Holy Heart of Jesus* left Borritz's care (possibly sometime between 1780 and early 1782), Borritz may have purchased the ship *Queen of France.* The vessel first appears in North Carolina port records in 1785, roughly one year after Borritz received payment for the delivery of 45 cannon in *Holy Heart of Jesus*, and three years after Borritz wrote his 1782 petition (Borritz 1782; Neidinger 2000:48). Being a 200-ton vessel, *Queen of France* was certainly large enough to carry a cargo of 45 cannon. There is, however, no evidence that *Queen of France* was ever registered under the name *Holy Heart of Jesus* or *Fair American*, and no evidence that Borritz owned *Queen of France* during the Revolutionary war.

Several vessels named *Fair American* appear in the state port records in the years following the Revolutionary War. Most of those were well below the 130-ton minimum, too small for the former *Holy Heart of Jesus*. Only one *Fair American* in the port logs matches this criterion: a ship of 140-tons, owned by Andrew Muir & Co. of Norfolk, Virginia. Andrew Muir's vessel, however, did not make its appearance until 1786, at least four years after Borritz may have parted with *Holy Heart of Jesus*. Thus, it is unlikely that Muir's *Fair American* was connected to Borritz (NCOSA 2024:8159). Furthermore, both *Queen of France* and Muir's *Fair American* were too small to be candidates for the John's Island Wreck, which was estimated at 250 tons (Neidinger 2000:121).

If the word "formerly" on Borritz's 1782 petition was indeed smudged, it implies *Holy Heart of Jesus* may have changed owner, name, and home port before 1782, and therefore,

Edenton and *Holy Heart of Jesus* were no longer associated. Between the delivery of the cannon and the ship's fate the only vessels currently tracked through the port records were too small to be the John's Island Wreck. Because the vessel only reappears in Edenton after 1778 in secondary sources, it was possible that *Fair American*/*Holy Heart of Jesus* left Edenton after the cannon delivery to continue service under another owner or wrecked between 1780 and 1781. Finally, if the word "formerly" on the 1782 petition is struck through, the source still disagrees on the location of the alleged remains of *Holy Heart of Jesus* in Edenton, with the only constant reference indicating a wreck site nearly a kilometer ("half a mile") up Pembroke Creek (Wiggins 1944:5; 1949:7; 1954:7). Thus, these historical data suggest that the historic ship *Holy Heart of Jesus* is highly unlikely to be the vessel associated with the John's Island Wreck.

5.2. Archaeological Evidence

As discussed above, historical evidence disputes the previous suggestion that the John's Island Wreck is the remains of *Holy Heart of Jesus*. Several structural features documented through archaeological research at the site are also inconsistent with those expected of oceangoing cargo vessels and instead present a different and more plausible interpretation. Despite the John's Island Wreck being investigated as a possible transatlantic cargo ship twice before (1980 and 1993) and neither prior investigation reaching a definitive conclusion, it has been tenuously associated with *Holy Heart of Jesus* ever since.

The John's Island Wreck had a length to beam ration of 5.2:1 which is inconsistent with vessels of the time period used for hauling cargo. That ratio indicated a long, narrow vessel, which is significantly different from the those seen on cargo vessels from the Revolutionary War period, such as the 3.2:1 ratio for the privateer brig *Defense,* 3.2:1 for the collier brig *Betsy,* 3:1 for the British Collier Wreck, and 3:1 for the schooner *Nancy* (Switzer 1983:45; Vanhorn

2004:228-230). Throughout the revolutionary period, shorter length to beam ratios (roughly 3:1) were common for cargo vessels, however, those for galleys were known to be larger. For example, South Carolina ordered a large galley with a 30.5 m (100 ft) keel and a 7.9 m (26 ft) beam in June 1777, which produced a vessel over 300 tons and a 4:1 length to beam ratio (Salley 1912:74).

Watercraft with longer length to beam ratios were generally designed for speed not cargo, as the slender body provided less resistance in the water (Steffy 1994:254; Le et al. 2023:22). A profile consisting of a flat-bottomed hull accentuated a vessel's ability to move between environments, allowing penetration far upstream in shallow waters by alternating between propulsion methods (sails to oars). Due to the shallow deadrise of the John's Island Wreck and historical use of galleys during the American Revolution, archaeological sites of 18th century American galleys were considered as sources of information. Although several locations of possible galley wrecks are known, such as Lake Champlain in New York, and Chickahominy Shipyard in Virginia (Short 1977), no other archaeological excavations have been published to date pertaining to these wrecks. The only two confirmed galley sites in a North American context were the remains of USS *Congress* (no published works) and those of USS *Allen,* the latter having been first excavated in 1981 by Kevin Crisman and Arthur Kohn (Emery 2014:283-285). The wreck of USS *Allen* rests in the cold, fresh water of the Poultney River in New York on a river bottom of coarse sand and heavy clay with low tidal and current forces acting upon the remains (Emery 2003:164). Even though USS *Allen* was intentionally salvaged, over 50% of its hull remained. Upon initial inspection, visual similarities between it and the John's Island Wreck were striking.

Both USS *Allen* and the John's Island Wreck share a similar length to beam ratio—John's

Island: 5.2:1; USS *Allen*: 5.02:1—and a comparable shape. Both wrecks also exhibited similar deterioration, specifically in each vessel's bow where cant frames along both the port and starboard sides are missing. Archaeological data indicated some deviations from the plan used to build USS *Allen*, with modifications noted across the site interpreted as efforts to combat hogging and sagging, a primary structural issue well known to galleys even in the ancient world (Steffy 1994:273, Emery 2003:167, 271). Working with limited materials and time, master shipwright's Noah and Adam Brown increased the size of USS *Allen's* keel, floors, and frames, thereby adding structural support and weight to strengthen the vessel's hull (Emery 2014:271-291). The multi-component rider keelsons recorded on the John's Island Wreck, on the other hand, are thought to have added weight to the vessel's centerline, while also providing structural support to keep the vessel from hogging and sagging.

Parallels in the placement of a ballast concentration were also observed at the two sites. For the John's Island Wreck, a scattered ballast pile located aft of the bow was comprised of brick and stone of varying types. Pig iron ballast used for USS *Allen* was also concentrated in a discreet pile, though located just forward of its stern. For USS *Allen*, cannon placement was likely the reason for this inclusion. Originally armed with a 24-pounder on its stern, it was replaced in 1817 with a 12-pounder installed at the bow. The reduction and shift of weight required pig iron ballast to be added forward of the stern to balance the altered weight in the bow created by the cannon (Emery 2003:151). Galleys used in the late 18th century were typically armed with heavy cannon placed at both their bow and stern, an armament style reminiscent of a 15th century Venetian *rambade* (FIGURE 39) (Guilmartin 1974:200; Sanchez-Saavedra 1978:157; Stroud 2002:22-23). Although no cannon were recovered from the John's Island Wreck, the 1980 excavation saw the recovery and documentation of iron shot located at the

keelson near the mizzenmast. The four-iron shot were of varying weights, but all had a diameter of 11.3 cm (4.75 in). Originally thought to be shot for a 24-pounder, a reassessment based on diameter determined them to be more likely associated with a 12-pounder gun (Neidinger 2000:133). While it is possible the munitions functioned as either ballast or cargo, it was equally possible that the cannon balls indicate that the John's Island Wreck was once armed with a stern mounted 12-pounder. Being a valuable piece of ordnance, any cannon left on site was likely to have been reclaimed by salvors in the past. The respective armament style of USS *Allen* and potentially the John's Island Wreck, may explain the observed similarities in ballast placement at either end as compensating for a similar imbalance caused by the absence of armament (Emery 2003:64; Snow 1936).

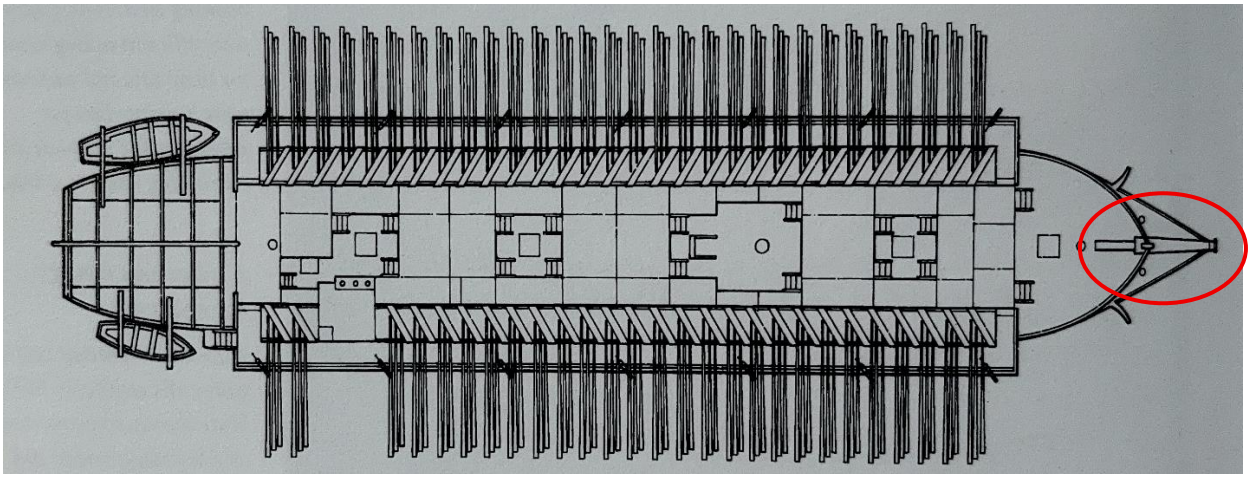

FIGURE 39: Artistic interpretation of a 15th century Venetian galley with early *rambade*, circled in red, at the bow (Guilmartin 2002:112).

Further similarities between the two vessels include a shared bow shape, referred to as a bluff bow (Neidinger 2000:78; Emery 2003:260-261). The bluff bow feature was previously interpreted as expanding cargo capacity for the John's Island Wreck. While bluff bow designs undoubtedly achieved that goal, bluff bows were also a trait desirable for use in conflict contexts. Bluff bows reduced material weight at the bow and stern and provided structural support to

manage recoil from a bow mounted cannon (Emery 2003:69). The 1993 John's Island Wreck investigation noted that the width of the radial cant frames on the site increased in thickness as they reached the bow (Neidinger 2000:78, 60).

The remains of USS *Allen* consisted of the vessel's floor timbers, first futtocks, and second futtocks, with none of the upper frame timbers surviving, which was similar to the remains documented at the John's Island Wreck. Room and space for floor timbers at the John's Island Wreck were tight for such a large vessel, averaging 40 cm (16 in) at midship. A dedicated naval galley, USS *Allen* had slightly larger room and space at midship, averaging 60 cm (23.6 in) to 80 cm (31.5 in) (Emery 2003:247, 263). Based on data recovered, USS *Allen* was a lighter vessel than the John's Island Wreck, with an estimated burden of between 70- and 100-tons (Emery 2003:263).

The floors of both vessels were wider than their respective lower futtocks. The average futtock documented for USS *Allen* measured 12.7 cm (5 in) sided, while those of the John's Island Wreck averaged 15 cm (5.9 in) (APPENDIX D). Futtock fastenings show similar shared irregularities between the two vessels. For USS *Allen,* the starboard first futtock did not match the fastening pattern of its following futtocks and was instead attached to the aft side of its respective floor timber (Emery 2003:247). This framing style was reminiscent of the reversing futtock placement seen at the John's Island Wreck, beginning at the transition from bow to midship.

The saddle mast step recorded at the John's Island Wreck was positioned approximately 4.6 m (15 ft) aft of the bluff bow. The saddle mast step allowed the sailors aboard the vessel to rake or angle the mast either forward or aft, adjusting it as required by rig and circumstance. The saddle step on the John's Island Wreck was pinned to the keel assembly via wrought iron drift

pins on each side. Because of this, it is unlikely to have been longitudinally adjustable, functioning instead as a fixed point.

The bluff bow shape of the John's Island Wreck provided ample room for a forward gundeck upon which to mount a cannon, an armament common for galleys during the Revolutionary War (Salley 1912:55-56; NHHC5 1970:15-16). Considering the bow structure of USS *Allen*, a vessel which was equipped with a forward gun deck, similarities were noted. Despite the lack of a saddle mast step on USS *Allen*, spacing from the foremast to the stem was like that of the John's Island Wreck. Functionally, the rounded bluff bow design of USS *Allen* resulted in the vessel having difficulties "biting" in the water, which impeded its ability to press windward, a design flaw likely to have impacted the John's Island Wreck as well (Emery 2003:261). To remedy this, USS *Allen's* shipwrights gave the vessel a finer stern run, another structural trait shared with the John's Island Wreck (Neidinger 2000:69-70; Emery 2003:261). Due to the 31 m (101 ft) length of the John's Island Wreck, shipwrights may have intentionally installed the large saddle mast step at the foremast to add weight to the bow to minimize its lateral movement on the water when under sail.

The John's Island Wreck also lacked sacrificial hull planking or sheathing, a vital feature for ocean-going cargo ships. Its absence may coincide with other galley designs from the Revolutionary War, as there exists some ambiguity about the use of sacrificial hull planking at that time, especially on vessels that ran in and out of fresh water. The lack of sacrificial hull planking further challenges an association with *Holy Heart of Jesus*, as a transatlantic cargo ship required hull sheathing for protection from shipworms. To date, no source explicitly details re-sheathing galleys with sacrificial hull planking. In one instance the South Carolina Naval Board placed an order for 1219 m (4000 ft) of 2.5 cm (1 in) thick pine boards which was commonly

used for sheathing; however, the ultimate use of those boards is unknown (Salley 1912:74). Additionally, First Commissioner Edward Blake ordered sheathing and other planking for the South Carolina State Shipyard. And though no specific vessel was identified for use, there was a galley under construction at the time (Salley 1912:127).

It is possible that some galleys used during the Revolutionary war were unsheathed. It is also important to note that the absence of evidence is not necessarily evidence of absence; documentary evidence records that galleys such as *Delaware* and *Convention*, built by the Pennsylvania, cruised the lower Chesapeake Bay and along the Atlantic Coast (Jackson 1974:346). Similarly, Virginia State galleys such as *Diligence* and *Accomack* were constructed for use in both rivers and the open sea. Furthermore, the South Carolina state galley *Comet* was assigned to "proceed directly to one of the French Islands in the West Indies…" (Thompson 1857:11; Salley 1912:15). These vessels may have been sheathed with sacrificial hull planking due to their intended use in saltwater. No investigation of a known galley site has yet documented the presence of sacrificial hull planking. Thus, the lack of archaeological evidence for sacrificial hull planking on the John's Island Wreck may reflect an intended use in a freshwater environment.

A tapered keel may be another feature shared between USS *Allen* and the John's Island Wreck. USS *Allen*'s 1813 contract calls for the shipwrights to taper the galleys keel to a width of four inches at the stern to meet the sternpost (Emery, 2003, p. 299).

Despite the John's Island Wreck being longer than USS *Allen* by nearly 9 m (30 ft), some similarities in their stern assemblies were also observed. The sternposts, while arranged in different fashions (FIGURES 40 and 41), both share a similar rake. The stern rake of the John's Island Wreck measured 71 degrees, exactly 10 degrees more than USS *Allen,* indicating the

potential for similarities in function. Evidence of the steering assembly was present at both sites, with the John's Island Wreck including a lower gudgeon and USS *Allen* a large eyebolt gudgeon in identical locations (Emery 2014:271-291). Gudgeons fitted to the stern indicated a centerline rudder and probable sail used for changing direction (Emery 2003:2-3). It is thought that variations in sternpost design between USS *Allen* and the John's Island Wreck are attributed to variations in the number of masts and types of rig used on each vessel.

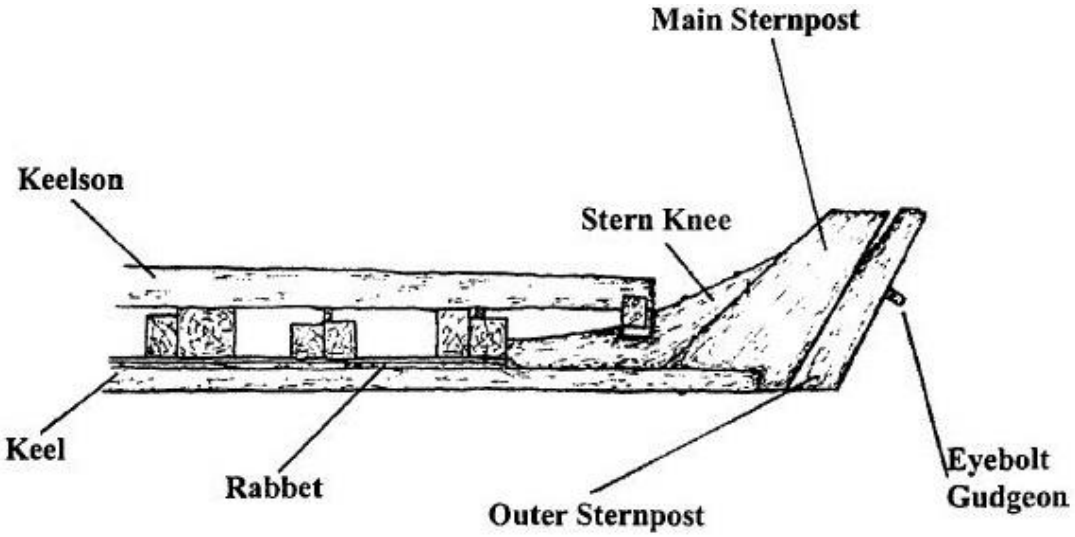

FIGURE 40: Stern profile for the row galley USS *Allen*, with the main (inner) sternpost, outer sternpost (timber), and eyebolt gudgeon indicated (Emery 2003:241).

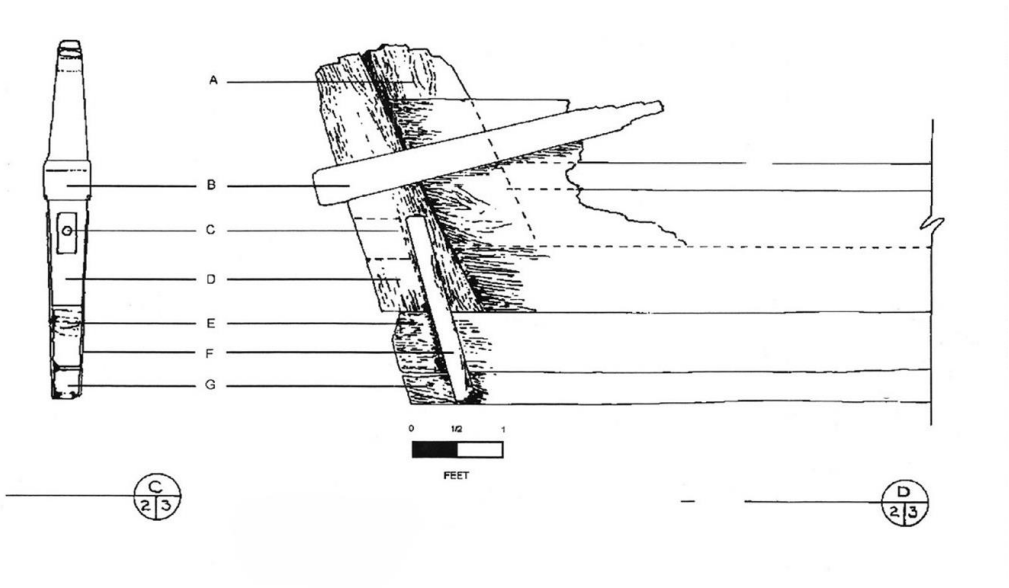

FIGURE 41: John's Island Wreck stern profile as recorded in 1993; A. inner sternpost. B. gudgeon strap. C. cavity with fastener. D. outer timber. E. keel. F. iron fishplate. G. keel-shoe (Neidinger 2000:71).

Another clue to the propulsion systems onboard the John's Island Wreck lies with an iron mast cap found at the site. Many galleys during this period were lateen rigged, which allowed them to sail into the wind (Campbell 1995:2). The iron mast cap recovered from the John's Island Wreck is important given the size of the two apertures and the inclusion of an eye. Because the mast cap was found on the port side at the stern of the vessel, between 0 m (0 ft) and 2 m (6.6 ft) along the baseline, it is possible that it may have once supported a stay or a lateen mizzen sail. Lateen sails were commonly used on mizzen masts on ships throughout the 16th and 17th centuries. By the 18th century lateen rigged mizzens were slowly phased out in favor of square, fore and aft spankers on larger sailing vessels. This type of rigging, however, was still utilized on galleys (Allan 2022:1). The presence of three mast steps in conjunction with the overall length of the John's Island Wreck suggest it was at one point rigged as a ship. Combined with the flat bottom profile, the vessel may be one of the few archaeological examples of a type of craft referred to as a galley-ship (Chapelle 1967:35, 63-64).

Galleys were characterized as vessels with flat bottomed hulls, shallow deadrise, and low freeboard (Chappelle 1951:31-32), that could be propelled either by sweeps (oars), sails, or a combination of the two (Chapelle 1967:34; Fleetwood 1995:73-74). Similar in some respects to ships, galley-ships had flatter bottoms, shallower deadrise, and lower freeboards than their counterparts (Chapman 2006:49). Unlike traditional galleys which were two masted and lateen rigged, galley-ships had three masts rigged with square sails but also retained sweeps (Chapelle 1967:36; Chapman 2006:49). As with many other North American vessel types, galley-ships arose from merchant shipping needs experienced in the early 18th century.

As the use of galley-ships expanded, multiple variations were constructed by the Royal Navy in the first half of the 18th century. Varying in length, those vessels showed diversification in hull design by the mid-18th century (Chapelle 1967:63; Chapman 2006:49). Classified as sixth rate vessels, galley-ships such as HMS *Lyme* mounted between 20 and 24 guns (Chapelle 1967:36, 62, 63). In mercantile contexts, vessels that could easily traverse riverine and open ocean environments were required. By using a ship rig on a long, flat-bottomed hull that could operate in shallow water, galley-ships presented a viable solution. In practice, their fusion design allowed these ship-rigged vessels to use sweeps in riverine environments, effectively transforming them into row-galleys. This feature made galley-ships advantageous throughout the shallow Carolina sounds. To date, no plans of American-built merchant galleys are known, thus the study of the John's Island Wreck is potentially informative (Chapelle 1967:35-36).

5.3. Hull Design

Galleys were first utilized in British colonial contexts for merchant shipping needs. Flat bottomed hull profiles allowed them to penetrate the shallow waterways of the southeastern colonies. As the southern American colonies grew to become timber heartlands of the British

Empire in the 18th century, flat bottomed vessel designs proliferated with two sailing variations preferred for British shipping contexts: a three masted ship rig prominent in the southern colonies, and a two masted brigantine rig in the northern colonies (Chappelle 1967:35-40). Other, non-British flat-bottomed designs were used throughout the southern colonies and referred to broadly as plantation boats. These vessels grew out of a log-based vessel type called a periauger, a common river transport used throughout the Carolinas (Hocker 1992:16). In the south, multiple vessel types were derived from periaugers including variations of coastal sloops. A commonality observed between periaguers, and other plantation vessels was use of unorthodox wood for integral structural components, such as yellow pine for the keel (Hocker 1992; Pecorelli 2003; Vanhorn 2004:123). Examples of this type include the B&B Wreck and the Browns Ferry Wreck, both documented in South Carolina (Pecorelli 2003; Vanhorn 2004:143-144).

Considering the structural features of the John's Island Wreck, the probability that it represents the remains of a +200-ton cargo hauling vessel is low. Instead, design features such as a length to beam ration of 5.2:1, flat bottom, reenforced centerline, and three mast steps, all suggest it was a large galley capable operating in both inshore and ocean environments. Historical research firmly established that galleys were used prolifically throughout colonial North America. Since they were constructed to accentuate parameters defined by their operational environments, they could be relatively small, with a keel length of 18.2 m (60 ft), or quite large, with a keel length of 31.7 m (104 ft) (Salley 1912:74; Snow 1936). A reflection of their scalable size and versatile nature, galley type vessels were referred to by a variety of different names throughout historical documents. In Pennsylvania, Delaware, the Carolinas, and Georgia, galley type vessels were called ships, brigs, or galleys (Salley 1912; Jackson 1974).

From those documents, it is clear that vessels from the Revolutionary period were colloquially referenced by either their rigging or hull design(s), with one reference not constraining the other, despite variations in uses.

The only other confirmed galley remains dating to the Revolutionary War were those of USS *Congress*, a Continental vessel that was scuttled in Vermont in 1776. The wrecked USS *Congress* was the subject of two seasons of archaeological excavation by a team from the Lake Champlain Maritime Museum (LCMM) under a permit granted from the Navy History and Heritage Command (Gilligan and Sabick 2021). Although the findings of the USS *Congress* investigation have yet to be formally published, LCMM researchers offered a rough structural description and short preliminary scantling list for comparison with the John's Island Wreck (Chris Sabick 2024, elec. comm.).

Unlike USS *Allen*, USS *Congress* was constructed with a "open framing" pattern, indicating that most floors and futtocks were not fastened together laterally, a trait shared with the John's Island Wreck (Neidinger 2000:60; Emery 2003:64; Chris Sabick 2024, elec. comm.). This construction style was common for vessels built dating to the second half of the 18th through the first quarter of the 19th century (Chris Sabick 2024, elec. comm.). USS *Congress* was built to heavier specifications than the John's Island Wreck, a possible indicator that the latter was not originally built as a warship. The sided dimensions of USS *Congress*'s futtocks range in size from 15.7 cm (6.2 in) to 26.6 cm (10.5 in), which at maximum thickness are larger than the 15 cm (5.9 in) average recorded at the John's Island Wreck. The floors for the two vessels, however, were much closer in size. USS *Congress* included an average molded floor dimension of 20.3 cm (8 in) and 16.2 cm (6.4 in) sided, which is like the John's Island Wreck's 23 cm (9 in) molded and 19 cm (7.5 in) sided. The similar floor sizes may speak to a comparable

bottom profile, with USS *Congress's* thickened futtocks likely being an expression of its intended purpose as a naval craft.

Although the archaeological comparison between USS *Allen* and the John's Island Wreck showed many interesting similarities, USS *Allen* was constructed in 1814, a half a century later than the John's Island Wreck. Thus, USS *Allen* represents a refined, dedicated naval expression that was built from plans, while the John's Island Wreck is likely an older iteration of galley design derived from plantation boat/merchant/privateer shipping from the 18th century. As a formal colonial navy did not exist in America in the 18th century, the line between merchant and military was thin, therefore, the roles the John's Island Wreck played throughout its life are uncertain.

5.4. Possible Historical Connections

With the previously postulated association between *Holy Heart of Jesus* and the John's Island Wreck is deemed unlikely based on both historical and archaeological evidence, a lingering question remains: is a determination of the wreck's historical identity possible? While it was not possible to tie the John's Island Wreck to a definitive historical identity, a few vessels associated with Edenton during the Revolutionary War period are plausible candidates.

5.4.1. *Caswell* and *Washington*

Of the many types of watercraft that operated in and around Edenton throughout the Revolutionary War, at least three were galleys. The North Carolina galleys *Washington*, named for General George Washington, and *Caswell*, named for Governor Richard Caswell, were both present in Edenton (Rankhorn 1833). As discussed previously, *Washington* and *Caswell* began construction in 1776 (NHHC7 1976:247, 329, 1263) at South Quay, Virginia, approximately 56

kilometers (35 miles) up the Chowan River from Edenton. *Caswell*'s home port was Edenton, though its station was Ocracoke Inlet (Rankhorn 1833).

As was common for the time, *Caswell* saw significant deviation from standard galley plans during its construction, and the result was a large, ship-rigged vessel (Hewes 1777; Delaney 1959:7). Records suggest that North Carolina officials feared that the galleys (*Washington* and *Caswell*) were built as full ships and not small galleys (Hewes 1777; Delaney 1959:7; Sanchez-Saavedra 1978:156). It seems that those fears were well founded, as pension applications from men who served aboard them during the war confirmed that although *Caswell* and *Washington* were built as galleys, they were large enough to be referred to as ships (Bond 1779; Rankhorn 1833; NHHC11 2005:802). Of the two vessels built at South Quay, *Caswell* in particular was said to have been "exceedingly well calculated for the purpose [protecting the bar] draws very little water and might be rowed through the shoals at any time on an emergency" (Hewes 1777). Because *Caswell* was often referred to as a ship, it likely sported three masts. Furthermore, the size of anchor cables in an order for cable and hemp rope placed by Thomas Whiting of the Virginia Naval Board for use on *Caswell* implies that the vessel was of considerable size and required three anchors, thus giving further credit to the possibility of three masts (NHHC6 1972:1418) (APPENDIX F).

Commanded by Captain Willis Wilson, *Caswell* was heavily armed and carried a large crew which fluctuated between 145 to over 180 personnel (Rankhorn 1833; Wilson 1843). Unlike galleys built by the PSN, which prescribed 9-pounders for its galleys (Sanchez-Saavedra 1978:156), *Caswell* was more heavily armed. According to a 1778 munitions restocking order for *Caswell*, it carried over 30 carriage guns, with a mixture of 18- and 6-pounders, and at one time was loaded with "two hundred, eighteen-pound ball, and six hundred, six-pound ditto"

(Pearce 1832; Rankhorn 1833; NHHC11 2005:836). Further evidence of this heavy armament was seen in two separate pension applications from former sailors who served onboard *Caswell*, which state that the vessel was armed with a compliment between 32 and 36 carriage guns (Pearce 1832; Rankhorn 1833).

Although *Caswell*'s size was not specifically recorded, estimations were drawn based on descriptions of its armament. If *Caswell* carried 36 carriage guns, as the Rankhorn pension (1833) attests, each gun's crew, consisting of four to six personnel, required approximately 1.5 m (5 ft) of space to work. Guns may have been arranged 17 to a side, giving a rough length of 26 m (85 ft) of gunnery space along midship. The vessel may also have incorporated approximately 2.7 m (9 ft) to 4 m (13 ft) for one or two guns mounted on a foredeck and a final 2 m (6.6 ft) to 3 m (9.8 ft) at the stern for a single gun crew and room for a helmsman to stand and operate the tiller.

Contention remains, however, regarding the quality of *Caswell*'s construction, as it was only in service for two years before being deemed unseaworthy due to hasty construction with green timber. *Caswell*'s planks eventually rotted, and it was reportedly sunk at its station in June 1779 (Jefferson 1779b). Whether its last station was Edenton or South Quay remains an open question, as Joseph Rankhorn's 1833 pension application states that "the captain [Wilson] therefore sailed back to Edenton, and from there, to a place called South Key [Quay] on the Chowan River, he then left the *Caswell* and took another ship [galley *Washington*] which was then entirely new and indeed was not rigged off [*sic*] when they arrived" (Rankhorn 1833). Upon arriving at South Quay, Captain Wilson transferred the armaments, munitions, sails, rigging, and other equipment from *Caswell* to *Washington* (Rankhorn 1833). The Rankhorn account is odd as it seemed unlikely that the captain and crew sailed an already leaking vessel back up the

Chowan. Instead, it seems more logical that after *Washington* was brought downriver to Edenton (a task that did not require rigging due to the river's flow), the arms, munitions, and crew were transferred from *Caswell* to *Washington*, the latter was then rigged and (theoretically) made ready for service.

After examining the galley *Washington*, Captain Wilson determined that it too, was not seaworthy so he abandoned it at Edenton, opting to leave Lieutenant Charles S. Bush in command (Rankhorn 1833). Rankhorn (1833) stated that Captain Wilson declared *Washington* to be so poorly constructed it was unfit for service. Wilson left *Washington* in Edenton and returned to his residence in Virginia, opting not to return to the vessel. There is cause to question Wilson's assessment of *Washington's* construction as he had been away from his Virginia residence for quite some time and spent his own funds in maintaining the vessels (Rankhorn 1833). Furthermore, despite Captain Wilson's declaration, *Washington* was indeed seaworthy as it continued service under Lieutenant Charles S. Bush. Bush commanded the vessel until it was no longer in service, sometime in 1780, when it may have been sold to a private buyer, as indicated in a letter to Richard Caswell from Thomas Jefferson where the latter urged the North Carolina Governor to sell the vessel (Jefferson 1779b).

The fate of *Caswell* remains a mystery, whether it returned to Edenton where it later rotted and sank, or if it stayed in South Quay where it suffered the same fate. Like *Caswell,* the fate of *Washington* remains a mystery. It is possible that *Washington* remained at Edenton and may represent the remains of the John's Island Wreck. It is important to note, however, there is no known evidence which speaks to this as the post-war fate of *Washington* and not enough structural information related to it is available. If the large galley *Caswell* remained or returned to Edenton, it is possible that its remains may be those represented by the John's Island Wreck.

After being deemed unseaworthy, the derelict hull might have been pulled up into the marsh, where it sat in the mud for use as a storage warehouse or simply abandoned.

Evidence documented on the John's Island Wreck indicated it may have once sat higher on the marsh as wood sample analyses and barnacle growth documented on the remains suggest they were exposed to periods of moisture and dryness (Newsome 1994). Bio-archaeological evidence also suggests other similarities between the John's Island Wreck and the fate of *Caswell.* Thomas Jefferson writing to Richard Caswell in 1779 describes hearing of how *Caswell* had sunk at its station, with "her bottom is eaten out" (Jefferson 1779a). The language Jefferson used is similar to that used in the testimony of William Purcell (1792), ships carpenter on HMS *Bounty*, who stated, "I then told Mr. Christian I hoped he would not send anybody in that boat, as her bottom being eaten out by the worms…" The similar language suggests that in addition to structural issues caused by builder shortcuts and inadequately seasoned timber, *Caswell* also suffered from a serious shipworm (*Teredo navalis*) infestation, likely picked up at its station, Ocracoke Inlet, as they could not survive in the predominantly freshwater environment of Edenton bay. The presence of a shipworm infestation was another bio-archaeological trait shared with the extant remains of the John's Island Wreck, as observed in all three fieldwork projects (Watts 1981:9; Neidinger 2000:73; Raupp et al. 2025).

In addition to bio-archaeological evidence, structural evidence documented on the John's Island Wreck also suggests similarities to accounts of *Caswell*'s rushed construction. The small keel reenforced by a rider keelson assembly, for instance, was a configuration unseen on most other 18th century wrecks (Lawrence 1993b). Additionally, the choice of pine for the first and second futtocks was unorthodox in 18th century ship construction, since soft woods were not often used for structural timbers. Instead, those components were generally constructed from

various species of oak, while pine was most often used for masts, deck planking, ceiling planking, and outer hull planking. Notably, the lack of outer hull sheathing on the John's Island Wreck likely contributed to the severe shipworm infestation, a construction feature suspected to be shared with *Caswell* based on historical documentation. Although the actual size of *Caswell* was unknown, based on descriptions referring to it as a "ship," the order for three large anchor cables, and the number of guns which the vessel is said to have carried, it was likely a formidable vessel of considerable size (Pearce 1832; Rankhorn 1833; NHHC6 1972:1418).

5.4.2. *General Arnold*

In addition to the galleys *Caswell* and *Washington*, circumstantial evidence suggests there may be a link between the John's Island Wreck and the row galley *General Arnold*. As stated previously, it was captained by former Continental officer and turncoat Michael Quinn, who raided Edenton in 1781. Emboldened by the capture of Wilmington at the hands of British Major James Craig in January of 1781, Loyalist groups throughout the Carolinas and Virginia conducted widespread raids on Continental ships and settlements. With Continental supplies and troops in the Carolina coastal region already stretched thin, their response to Loyalist raiding activities was constrained. Subsequently, loyalist raiding throughout North Carolina resulted in at least one murder, causing fear and stress to spread throughout the region (Dixon 1781). To harass Whig settlements and supplies, Loyalist raiders used galleys to hit settlements and stockpiles far upriver, then retreated to the coast where the British established a more permanent presence.

In line with the Loyalist preference for using row galleys, Michael Quinn attacked Edenton in one that was ship-rigged (Lamb 1781) and burned the town's waterfront. He destroyed a merchant schooner, ruined over 700 hogsheads worth of trade goods, and finally

absconded with a local merchant's vessel, before taking refuge in the marsh off Edenton (Higginbotham 1978:252). Seeking revenge for the damage inflicted upon the town, Edenton merchants organized and quickly funded a small group of vessels to retaliate. Attacking *General Arnold* at night, they caught the raiders by surprise (Babits and Howard 2008:20). After a short skirmish, Quinn and 18 raiders were returned to Edenton in irons; ten were captured from Robert Smith's stolen schooner and eight were taken from the galley, a number far too few to operate the vessel (Babits and Howard 2008:19-20). It is unknown if the majority of Quinn's crew fled into the marsh or if they were killed trying to defend the galley.

A 1781 account of the merchants' expenses included twelve pounds of musket balls and fourteen pounds of swivel balls, evidence indicating the Edenton merchants set out with a light supply of lethal force, however there is no evidence to suggest a battle occurred in reclaiming the stolen property (Babits and Howard 2008:20). After capturing Quinn and his vessel, the townsfolk towed the ship-rigged galley back to Edenton Bay where it became the communal property of the town, and its fate became ambiguous.

Some accounts speculate that Quinn's vessel may have been the privateer galley *Tartar,* launched at Edenton in 1782 (Babits and Howard 2008:20). Curiously, only one *Tartar* appears in 18th century North Carolina port records. Appearing in 1783 on the North Carolina port logs, one year after the *Tartar* privateer from Edenton was allegedly launched, that vessel was based at Port Roanoke (another 18th century name for Edenton) and logged as a brig (NCOSA 2024:11840). Since the brig was a two-masted vessel, it is unlikely *General Arnold,* which was reportedly a three-masted vessel. While it is possible that one of *General Arnold*'s three masts was taken down, the *Tartar* launched in Edenton in 1782, and the *Tartar* recorded in Edenton in 1783, may not be the same vessel since ships sharing the same name was quite common during

the 18th century (NCOSA 2024:11840). Other colloquial accounts regarding *General Arnold*'*s* fate after being captured suggest that it may have been used as a communal warehouse shared by the town's merchants, but no historical documentation explicitly stating such account exists. It is possible that both accounts were true since a retired privateer vessel could easily have been used as a floating warehouse. After enough time, the derelict hull became rotten, and was likely stripped, salvaged, and burned for its fasteners. A common end for abandoned vessels of the time, archaeological evidence suggests this was the fate of the John's Island Wreck.

Artifacts documented and recovered from John's Island Wreck across the three fieldwork seasons (1980, 1993, 2024) were not concentrated in any one area. The comprehensive artifact assemblage from the John's Island Wreck consisted of a variety of materials, many of which may have been present in a captain's cabin. And because they were found spread across the site, with some materials excavated from three separately dredged trenches, it was thought more likely that the material was consistent with objects used in a warehouse or storage context: marketable ballast, iron shot, pharmaceutical glassware, plate glass, a tea caddy (FIGURE 42), gin bottles, and barrel components.

The flat bottom profile of the John's Island Wreck combined with the comparative structural similarities to USS *Allen*, and the similar construction style and timber measurements to galley USS *Congress*, suggest that the John's Island Wreck was likely a type of galley. Unlike the two masted, lateen rigged USS *Congress* built for use on Lake Champlain*,* the presence of a mast cap found along the starboard stern quarter and the three documented mast steps strongly suggest that the John's Island Wreck was rigged as a ship, the same rig used by galleys *Caswell, Washington*, *Hero*, *Gloucester*, *Diligence*, and *General Arnold* (Lamb 1781; Thompson 1857:11; Sanchez-Saavedra 1978:156).

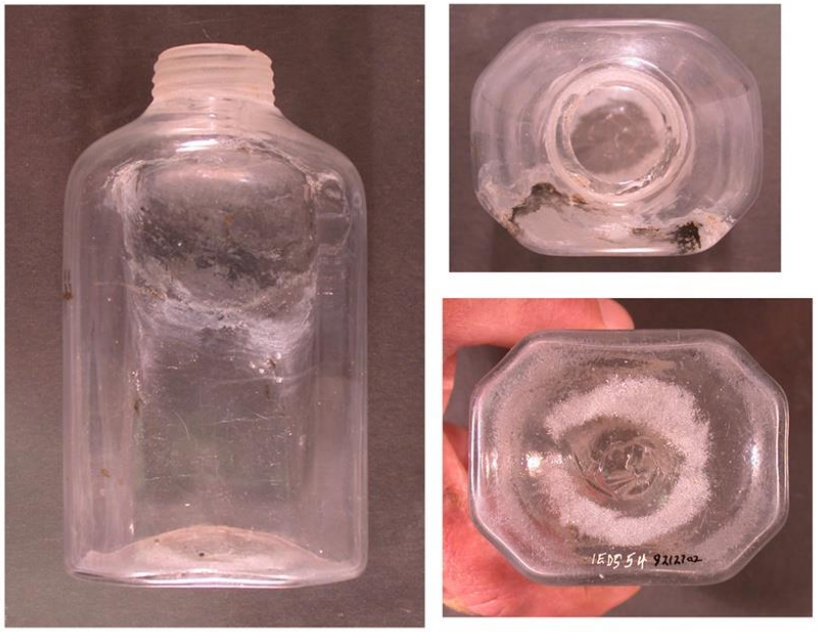

FIGURE 42: Colonial period tea caddy recovered from the John's Island Wreck in 1993 (Neidinger 2000:91-92).

Though the origins of *General Arnold* remain unknown, it may have been a privateer vessel, privately built, and owned by Loyalists somewhere on the southeastern coast. It is also possible that *General Arnold* was a British prize, taken from Continental forces earlier in the war. When the British captured Charleston, several galleys were taken and used by them. As the British looked to shore up their position throughout the Carolinas, it was clear to their commanding officers that naval forces were going to play a critical role in their success. As stated by Sir Henry Clinton when writing to Lord Cornwallis, "I am clear this [invasion of North Carolina] should not be attempted without a great naval force. I am not so clear there should be a great land force" (Saberton 2010:61). Recognizing the importance of galleys, Clinton went on to state that "one or two armed ships should be prepared and that as many gallies as can go to sea may likewise accompany you from hence" (Saberton 2010:61). During 1779, British naval presence throughout the Southern states highly valued galleys, actively seeking to capture them for reuse (Salley 1913:45-46). In accordance with the British emphasis on galleys, at least three

were stationed at Wilmington in 1781, including the British prize, HMS *Comet*, (Lyon 1993:224; NHHC11 2005:394, 558, 662). Despite the presence of British naval galleys throughout the North Carolina coasts, scant evidence exists to corroborate a Royal Navy association with the John's Island Wreck.

5.5. Research Findings and Future Research

The John's Island Wreck represents only the lower 20 percent of the vessel's original hull, with the remains showing evidence of having been stripped and salvaged prior to being intentionally burnt. While similarities to *Caswell* may be compelling, existing evidence is circumstantial and tenuous. Edenton Harbor became cluttered with abandoned ships due to economic circumstances changing post war. With the British blockade lifted, merchant traffic resumed unimpeded by the Royal Navy, causing ships to route away from Edenton and resume their pre-war courses (Goodall 2003:19).

Additionally, during the late 18th century, galleys and galley-ships were common throughout the Carolina sounds in both mercantile and military contexts. Mercantile galleys referred to as 'cargo galleys' were used throughout Virginia and the Carolinas to supply terrestrial military forces (NHHC7 1976:122). Able to push far upriver and resupply along the coasts, cargo galleys played an essential role in supplying Continental forces (NHHC7 1976:122). In conflict contexts, loyalist privateers used privately owned galleys to fight alongside British warships throughout the war (Neilan et al. 2025).

It is possible that the John's Island Wreck represents the remains of a merchant or privateer galley unrelated to *General Arnold* or *Caswell*, both of which may have ended up abandoned at Edenton. The state galley-ship *Washington* is not presently thought to have remained in Edenton after 1780. And despite it being said to have displayed "indifferent"

construction, similar to *Caswell* (Rankhorn 1833), no documentation is known which refers to *Washington* suffering from a shipworm infestation, a condition noted at the John's Island Wreck. With its harbor becoming a yard of derelicts, the John's Island Wreck could be any galley type vessel that wasted away in the post-war years at Edenton.

Although a definitive conclusion was not reached through this investigation, the circumstantial evidence matches equally between the ship-rigged galleys *Caswell* and *General Arnold,* with *Caswell*'s association presently having more historical evidence. Reaching a truly definitive conclusion would require further research, including a survey of old South Quay in Virginia to ascertain what, if any, ship remains may be located there. Such a survey may provide insight into the historical identity of the John's Island Wreck and broaden the knowledge of galley design and variation throughout 18th century colonial America.

Future investigations should take several steps to definitively answer lingering questions. If funds permit, a project aimed at excavating and documenting the starboard side of the John's Island Wreck could be especially fruitful. A future study may also consider both documenting and recovering the extant remains of the John's Island Wreck, as the site has undergone significant deterioration in the decades since 1993 and will likely continue to erode. It is of paramount importance, however, that known galley sites are documented for comparison. There remain multiple possible galley types resting in the waters of the Chickahominy Shipyard in Virginia (Short 1977). Documenting those would likely add to the extremely limited structural and design knowledge of American built galleys from the 18th century.

References

Allan, K. Phillip
2022 The Evolution of Sails in 18th-Century Warships. *Naval History Magazine* 36(1) <https://www.usni.org/magazines/naval-history-magazine/2022/february/evolution-sails-18th-century-warships>. Accessed 21 February 2024.

Babits, Lawrence
1993 John's Island Wreck, Edenton, NC – 17-18 June 1993. Field Notes. East Carolina University Program in Maritime Studies 1993 Summer Field School. Greenville, NC.

Babits, Lawrence, and Joshua Howard
2008 Our Captain Quinn: North Carolina's Benedict Arnold? *Tributaries* 15(1):13–26.

Bernard, W. D., and W. H. Hall
1845 *Narrative of the Voyages and Services of the Nemesis from 1840 to 1843 and of the Combined Naval and Military Operations in China: Comprising a Complete Account of the Colony of Hong-Kong and Remarks on the Character and Habits of the Chinese*. 2nd edition. Henry Colburn, London, UK.

Biddlecombe, George
1969 *The Art of Rigging, Containing an Explanation of Terms and Phrases and the Progressive Method of Rigging Expressly Adapted for Sailing Ships*. Edward W. Sweetman Company, New York, NY.

Bilodeau, Christopher J.
2013 Creating an Indian Enemy in the Borderlands: King Phillip's War in Maine, 1675-1678. *The Maine Borderlands* 47(1):11-37.

Bond, Hance
1779 Petition of Capt. Hance Bond Concerning Pay for the Crew of the Caswell. Transcribed by Will Graves. Southern Campaigns: American Revolution Pension Statements & Rosters <https://revwarapps.org/nc41.pdf>. Accessed 30 October 2025.

Borritz, William
1780 Petition to NC General Assembly. Housed in Hillsborough, Orange County, North Carolina. North Carolina Digital Collections <https://digital.ncdcr.gov/Documents/Detail/senate-joint-resolutions-august-30-september-13/705718?item=705795>. Accessed 22 March 2023.

Borritz, William
1782 Petition to NC General Assembly. Housed in Hillsborough, Orange County, NC. North Carolina Digital Collections <https://digital.ncdcr.gov/Documents/Detail/miscellaneous-petitions-apr.-may-1782/669789?item=669812>. Accessed 20 March 2023.

Boston Port Act (14 Geo. 3. C. 19)
1774 An Act to discontinue, in such Manner and for such Time as are therein mentioned, the

landing and discharging, lading or shipping, of Goods, Wares, and Merchandize, at the Town, and within the Harbour, of Boston, in the Province of Massachusetts Bay, in North America. 12th Parliament of Great Britain. British National Archives at Kew, London, UK.

Bowen, Frank C.
1943 The Frigate. *Royal United Services Institution Journal* 88(551):203-206.

Bratten, John R.
2002 *The Gondola Philadelphia and the Battle of Lake Champlain*. Texas A&M University Press, College Station.

Brenckle, Matthew <curatorial@usscm.org>
2014 *A Stoved Boat*. Life At Sea Blog, USS *Constitution* Museum <https://ussconstitutionmuseum.org/2014/11/25/a-stoved-boat/>. USS Constitution Museum, 25 November 2014. Accessed 7 February 2025.

Bright, Leslie
1993 Drawing of John's Island Wreck Stern Assembly. Field Notes. East Carolina University Program in Maritime Studies 1993 Summer Field School. Edenton, NC.

Broadwater, John D, Robert M. Adams, Marice Renner
1985 The Yorktown Shipwreck Archaeological Project: An Interim Report on the Excavation of Shipwreck 44Y088. *The International Journal of Nautical Archaeology and Underwater Exploration* 14(4):301-314.

Brown Family to Honorable Littleton Waller Tazewell (Brown)
1835 Letter in George Brown, VAS2693. Transcribed and Annotated by C. Leon Harris. Southern Campaigns: American Revolution Pension Statements & Rosters. Library of Virginia, Richmond <https://revwarapps.org/VAS2693.pdf>. Accessed 30 October 2025.

Bunyard, K. L.
2019 The Development of the Truck Gun Carriage: History, Archaeology, and Design. Master's thesis, Department of History, East Carolina University, Greenville, NC.

Burgess, Douglass R., Jr.
2016 *Engines of Empire*: *Steamships and the Victorian Imagination*. Stanford University Press. Stanford, CA.

Campbell, Ian
1995 The Lateen Sail in World History. *Journal of World History* 6(1):1-23.

Chapelle, Howard I.
1949 *The History of the American Sailing Navy: The Ships and Their Development*. W. W. Norton & Company, Bonanza Books, New York, NY.

Chapelle, Howard I.
1951 *American Small Sailing Craft: Their Design, Development and Construction*. W. W. Norton & Company, Bonanza Books, New York, NY.

Chapelle, Howard I.
1967 *The Search for Speed Under Sail 1700–1855*. W. W. Norton & Company, Bonanza Books, New York, NY.

Chapman, Fredrik Henrik
2006 *Architectura Navalis Mercatoria: The Classic of Eighteenth-Century Naval Architecture*. Reprint of 1768 edition. Dover Publications, Minola, NY.

Clifford, Sheila A.
1993 An Analysis of the Port Royal Shipwreck and its Role in the Maritime History of Seventeenth-Century Port Royal, Jamaica. Master's thesis, Department of Anthropology, Texas A&M University, College Station.

Crews, Ed
2006 Making, Baking and Laying Bricks. *Colonial Williamsburg Journal*. Colonial Williamsburg Foundation, Williamsburg, VA <https://research.colonialwilliamsburg.org/Foundation/journal/Winter05-06/bricks.cfm>. Accessed 12 June 2024.

Crisman, Kevin J.
2014 It Has Again Become Necessary to Add to Our Force on Lake Champlain: The US Navy Brig *Eagle.* In *Coffins of the Brave: Lake Shipwrecks of the War of 1812*, Kevin J. Crisman, editor, pp. 312-335. Texas A&M University Press, College Station.

Crittenden, Charles Christopher
1931 Inland Navigation in North Carolina, 1763-1789. *The North Carolina Historical Review* 8(2):145-154.

Delaney, Norman C.
1959 The Outer Banks of North Carolina During the Revolutionary War. *The North Carolina Historical Review* 36(1):1-16.

Dimmock, Lionel
1946 The Lateen Rig. *The Mariners Mirror* 32(1):35-41.

Dixon, Henry
1781 *Letter from Major Henry Dixon to General Sumner, May 1781*. State Records of North Carolina 15(1):464. University of North Carolina at Chapel Hill.

Dotson, John E.
1995 Economics and Logistics of Galley Warfare. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp. 217–223. Conway Maritime Press, London, UK.

Drane, Robert
1908 The Expedition Against the Row Galley '*General Arnold*' – A Side Light on Ccolonial Edenton. *The North Carolina Booklet* 7(4):267-277.

Dunaway, Wilma A.
1994 The Southern Fur Trade and the Incorporation of Southern Appalachia into the World Economy, 1690-1763. *Review (Fernand Braudel Center)* 17(2):215-242.

Emanuele, Daniel P.
1977 Ancient Square Rigging, With and Without Lifts. *International Journal of Nautical Archaeology* 6(3):181-185.

Emery, Eric.
1995 Row Galley Allen Collection. Lake Champlain Maritime Museum, Vergennes, VT <https://www.lcmm.org/collections/row-galley-allen-collection/>. Accessed 12 June 2024.

Emery, Eric
2003 *The Last of Mr. Brown's Mosquito Fleet: A History and Archaeology of the American Row Galley Allen on Lake Champlain, 1814-1825*. Doctoral dissertation, Department of Anthropology, Texas A&M University, College Station.

Emery, Eric
2014 A Perfect Willingness to See the Enemy on Fair Terms. The US Navy Row Galley *Allen*. In *Coffins of the Brave: Lake Shipwrecks of the War of 1812*, Kevin J. Crisman, editor, pp. 271-293. Texas A&M University Press, College Station.

Enright, Jeffery M.
1999 An Archaeological and Historical Survey of a Jeffersonian Gunboat. Master's thesis, Department of History, East Carolina University, Greenville, NC.

Faris, William
1794 *The Faris Diaries Part Two, 1794–1795: Silversmiths, Maryland, Annapolis Diaries; Clock and Watch Makers, Maryland, Annapolis Diaries*. Library of Congress, Washington DC <https://catdir.loc.gov/catdir/toc/fy044/2001059328.html>. Accessed March 7, 2024.

Fawcett, Nigel
1994 The Introduction of the Ram as a Weapon in Ancient Sea Warfare. *Military History Journal* 39(2):83-86.

Fay, Peter Ward
1975 *The Opium War: 1840-1842*. University of North Carolina Press, Chapel Hill.

Fleetwood, Rusty
1995 *Tidecraft: The Boats of South Carolina, Georgia, and Northeastern Florida, 1550-1950*. WBG Marine Press, Quantico, VA.

Fowler, William Jr.
1976 *Rebels Under Sail: The American Navy during the Revolution*. Charles Scribner's Sons, New York.

Frey, James W.
2009 The Indian Saltpeter Trade, the Military Revolution, and the Rise of Britian as a Global Superpower. *The Historian* 71(3):507-554.

Gardiner, Robert, and J. S. Morrison, (editors)
1995 *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*. Conway Maritime Press, London, UK.

Garrison, G. Ervan, Charles P. Gaimmona, James Jobling, Anthony R. Tripp, Eri N. Weinstein, and Gary A. Wolff.
1989 *An Eighteenth-Century Ballast Pile Site, Chandeleur Islands, Louisiana: An Instrumental Archaeological Study.* Texas A&M Research Foundation B3578, College Station, Texas. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office, New Orleans, LA.

Guilmartin, John F.
2002 *Galleons and Galleys*. Cassell & Co., Wellington House, London, UK.

Guilmartin, John F.
1974 *Gunpowder and Galleys: Changing Technology and Mediterranean Warfare at Sea in the Sixteenth Century*. Cambridge University Press, London, UK.

Goldenberg, Joseph A.
1976 *Shipbuilding in Colonial America*. Charlottesville: Published for the Mariners Museum, Newport News, Virginia, by the University Press of Virginia <https://archive.org/details/shipbuildinginco0000gold/page/n19/mode/2up>. Accessed 17 February 2024.

Goodall, Katherine I.
2003 The Burroughs Wreck: A Key to Eighteenth Century Ship Construction Techniques and the Life and Death of the Port of Edenton. Master's thesis, Department of History, East Carolina

University, Greenville, NC.

Gilligan, Cherilyn A. and Christopher R. Sabick
2021 Arnolds Bay Project 2021-2022: Mapping an American Revolutionary Site Across Transitional Terrain. MAHSNews, *Maritime Archaeological and Historical Society* 32(2):2-19.

Harris, Lynn B.
2014 *Patroon & Periaguas: Enslaved Watermen and Watercraft of the Lowcountry*. The University of South Carolina Press. Columbia.

Hasluck, Paul N.
1916 *Cassell's Woodworking: A Book of Tools, Materials, and Processes for the Handyman*. David McKay Publisher. Philadelphia, PA.

Henry, Patrick
1779 Letter from Patrick Henry to Richard Caswell, February 6th, 1779. State Records of North Carolina 14(1):19-20. University of North Carolina at Chapel Hill.

Hewes, Joseph
1777 Letter from Joseph Hewes to Richard Caswell, April 4, 1777. State records of North Carolina 15(1):442–443. University of North Carolina at Chapel Hill.

Hewett, Jacquelyn C.
2022 Bronze Age Aegean Ritual Watercraft Imagery: An Iconographic Analysis. Master's thesis, Department of History, East Carolina University, Greenville, NC.

Hocker, Frederick M.
1992 The Clydesdale Plantation Vessel Project: 1992 Field Report. *Institute of Nautical Archaeology Quarterly* 19:12–16.

Hocker, Frederick M.
1995 Late Roman, Byzantine, and Islamic galleys and fleets. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp. 86-100. Conway Maritime Press. London, UK.

Hoffmeyer, Ada B.
1966 *Military Equipment in the Byzantine Manuscript of Scylitzes in Biblioteca Nacional in Madrid*. Instituto de Estudios Sobre Armas Antiguas, Consejo Superior de Investigaciones Científicas; Patronato Menéndez y Pelayo, Granada. *Investigaciones Científicas* <http://gladius.revistas.csic.es>. Accessed 4 January 2025.

Homann, Johann Baptist
1715 Virginia, Marylandia et Carolina: In America Septentrionali Brittannorum Industria Excultae. North Carolina Collection, University of North Carolina Chapel Hill.

Horne, Robert A
1666 Primary Source: A Brief Description of the Province of Carolina. *Anchor: A NC History Online Resource* <https://www.ncpedia.org/anchor/primary-source-breif>. Accessed 17 February 2024.

Hosch, William L.
2025 Ballista: Ancient Missile Launcher. *Encyclopedia Britannica* <https://www.britannica.com/technology/ballista>. Accessed 10 March 2025.

Higginbotham, Don, ed.
1976 *The Papers of James Iredell, Vol. 1: 1767–1777*. Division of Archives and History, Department of Cultural Resources, Raleigh, NC.

Higginbotham, Don, ed.
1978 *The Papers of James Iredell, Vol. 2: 1778-1783*. Division of Archives and History, Department of Cultural Resources, Raleigh, NC.

Jackson, Claude V. III.
1991 Historical and Archaeological Investigations of a Sunken Federal Period Vessel Near Oriental, North Carolina. Master's thesis, Department of History, East Carolina University, Greenville, NC.

Jackson, John W.
1974 *The Pennsylvania Navy, 1775-1781: The Defense of the Delaware*. Rutgers University Press, New Brunswick, NJ.

Jarvis, Michael
1992 Cedars, Sloops and Slaves: The Development of the Bermuda Shipbuilding Industry, 1680–1750. Master's thesis, College of William & Mary, Williamsburg, VA.

Jefferson, Thomas
1779a Thomas Jefferson to Richard Caswell, 22 June 1779. National Archives of the United States. National Archives and Records Administration, University of Virginia Press, Charlottesville.

Jefferson, Thomas
1779b Thomas Jefferson to Richard Caswell, 30 June 1779. National Archives of the United States. National Archives and Records Administration, University of Virginia Press, Charlottesville.

Karkazis, John
2016 The Byzantine Navy: A Synopsis of Battles, Admirals and Tactics. University of the Aegean
<https://www.researchgate.net/publication/339487745_THE_BYZANTINE_NAVY_A_synopsis_of_Battles_Admirals_and_Tactics>. Accessed 7 January 2025.

Keith, Alice B.
1948 Relaxations in the British Restrictions on the American Trade with British West Indies, 1783-1802. *The Journal of Modern History* 20(1):1-18.

Kennedy, Michelle
2021 Brick by Brick: Examining a Material That Built New York. South Street Seaport Museum, New York, NY <https://southstreetseaportmuseum.org/brick-by-brick/>. Accessed 27 May 2024.

Kilby, Kenneth
1971 *The Cooper and His Trade*. John Baker Ltd, London, UK.

Lamb, Gideon
1781 Letter from Gideon Lamb to Jethro Sumner, May 28th, 1781. State Records of North Carolina 15(1):468-469. University of North Carolina at Chapel Hill.

Lawrence, Richard
1993a John's Island Wreck Midship Profile (1" =1'). Field Notes. East Carolina University Program in Maritime Studies 1993 Summer Field School. Edenton, NC.

Lawrence, Richard
1993b Richard Lawrence to Adriane Askins. North Carolina Department of Cultural Resources. Divisions of Archives and History. Raleigh, North Carolina.

Lawrence, Ryan, Shanecia Beckworth, Dominique Marshall, Malcom LeCompte and Linda Hayden
2015 Ground Penetrating Radar Survey of Edenton Green for Early Structural Remains. *2015 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)* 30(1):4288–4291.

Lambert, Andrew
2000 *War at Sea in the Age of the Sail.* Cassell, Wellington House, London, UK.

Lavery, Brian
1987 *The Arming and Fitting of English Ships of War 1600-1815*. Conway Maritime Press, London, UK.

Le, Hien T., Nguyen Duy Anh, Tran Ngoc Tu, and Nguyen Thi Ngoc Hoa.
2023 Numerical Investigation of Length to Beam Ratio Effects on Ship Resistance using Ranse Method. *Polish Maritime Research* 30(1):13-24.

Little, William
1888 *The History of Weare, New Hampshire, 1735-1888*. S. W. Huse & Co., Lowell, MA.

Luckenbach, Al, Esther Read, Dona Ware, and Tony Lindauer
1994 The Excavation of an 18th Century Dutch Yellow Brick Firebox and Chimney Stack in Anne Arundel County, Maryland. *Maryland Archaeology* 30(2):9-22.

Lyon, David
1993 *The Sailing Navy List: All the Ships of The Royal Navy, Built, Purchased and Captured, 1688-1860*. Conway Maritime Press. London, UK.

Mahoney, Meredith A. H.
2007 Hospitality, Civility, And Sociability: Taking Tea in Colonial Barbados. Master's thesis, Department of Anthropology, The College of William and Mary, Yorktown, VA.

McCusker, John and Russel Menard
1985 *The Economy of British America 1607-1789*. University of North Carolina Press, Chapel Hill.

Medlin, Eric
2023 Edenton's History 'An Everyday Part of Life' For Its Residents. *Coastal Review: A Daily News Service of the NC Coastal Federation*, Newport, NC <https://coastalreview.org/2023/10/edentons-history-an-everyday-part-of-life-for-residents/>. Accessed 19 February 2024.

Meide, Chuck
1994 *Bricks: An Overview of Form, Function, and Historical Types*. St. Augustine Lighthouse and Maritime Museum <https://www.academia.edu/2350581/Bricks_An_Overview_of_Form_Function_and_Historical_Types>. Accessed 22 May 2025.

Melby, Patrick
2012 Insatiable Shipyards: The Impact of the Royal Navy on the World's Forests, 1200–1850. Senior seminar paper, Western Oregon University, Monmouth, OR <https://wou.edu/history/files/2015/08/Melby-Patrick.pdf>. Accessed 5 November 2025.

Millar, John F.
1978 *American Ships of the Colonial and Revolutionary Periods*. W. W. Norton & Company, New York, NY.

Mitchell, Maggie
2015 Treasonous Tea: The Edenton Tea Party of 1774. Master's Thesis, Department of History, Liberty University. Lynchburg, VA.

Moore, Jonathan
2014 Frontier Frigates and a Three-Decker. Wrecks of the Royal Navy's Lake Ontario Squadron. In *Coffins of the Brave: Lake Shipwrecks of the War of 1812*, Kevin J. Crisman, editor, pp. 187-218. Texas A&M University Press, College Station.

Morris, John William III
1991 Site 44y088: The Archaeological Assessment of the Hull Remains at Yorktown, Virginia. Master's thesis, Department of History, East Carolina University, Greenville, NC.

Morris, John William III, Gordon P. Watts, and Marianne Franklin.
1995 The Comparative Analysis of 18th-Century Vessel Remains in the Archaeological Record: a Synthesized Theory of Framing Revolution. In *Underwater Archaeology Proceedings from the Society for Historical Archaeology Conference*, Paul Forsythe Johnston, editor, pp. 125-233. Society for Historical Archaeology, Washington, DC.

Morrison, John
1995a The Trireme. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp. 49-65. Conway Maritime Press, London, UK.

Morrison, John
1995b Hellenistic Oared Warships 399-31 BCE. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp. 66-77. Conway Maritime Press. London, UK.

Muller, John
1780 *A Treatise of Artillery*. Printed by Styner and Cist, for John Norman, Philadelphia, PA <https://archive.org/details/bim_eighteenth-century_a-treatise-of-artillery_muller-john_1780>. Accessed 30 October 2025.

Murray, A. T.
1919 *The Odyssey.* Translated by A. T. Murray. William Heinemann, London. G. P. Putnam's Sons, New York, NY.

Museo Correr
2025 *Galera del Provveditor di Armada imbandierata*. Procuratie Nuove Collection. Correr Museum, Venice, Italy <https://correr.visitmuve.it/en/il-museo/layout-and-collections/percorsi-e-collezioni/>. Accessed 5 February 2025.

Naval History and Heritage Command
1964 *Naval Documents of the American Revolution, Vol. 1: Dec. 1, 1774–Sept. 2, 1775; Dec. 6, 1774–Aug. 9, 1775*, William Bell Clark, editor. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
1966 *Naval Documents of the American Revolution, Vol. 2: Sept. 3–Dec. 7, 1775; Aug. 11–Oct. 31, 1775*, William Bell Clark, editor. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
1968 *Naval Documents of the American Revolution, Vol. 3: Dec. 8, 1775–Feb. 18, 1776; Nov. 1, 1775–Jan. 31, 1776*, William Bell Clark, editor. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
1970 *Naval Documents of the American Revolution, Vol. 5: May 9–July 31, 1776*, William James Morgan, editor. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
1972 *Naval Documents of the American Revolution, Vol. 6: Aug. 1–Oct. 31, 1776; May 26–Oct. 5, 1776*, William James Morgan, editor. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
1976 *Naval Documents of the American Revolution, Vol. 7: Nov. 1, 1776–Feb. 28, 1777; Oct. 6–Dec. 31, 1776*, William James Morgan, editor. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
1980 *Naval Documents of the American Revolution, Vol. 8: Mar. 1–May 31, 1777; Jan. 1–May 31, 1777*, William James Morgan, editor. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
2005 *Naval Documents of the American Revolution, Vol. 11: Jan. 1–Mar. 31, 1778*, Michael J. Crawford, E. Gordon Bowen-Hassell, Dennis M. Conrad, and Mark I. Hayes, editors. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
2019 *Naval Documents of the American Revolution, Vol. 13: July 1–Aug. 31, 1778*, Michael J. Crawford, Dennis M. Conrad, Peter C. Luebke, editors. Naval History and Heritage Command, Washington, DC.

Naval History and Heritage Command
2023 Continental Galley Washington, 1776. The American Revolution and the French Alliance. National Museum of the U.S. Navy, Washington, DC <https://www.history.navy.mil/content/history/museums/nmusn/explore/exhibits/the-american-rev-and-the-french-alliance.html>. Accessed May 27, 2024.

Naylor, Carl
1993 S.C. Shipbuilding in the Age of Sail. *The Goody Bag* 4(1): 4–8.

Neidinger, Adriane
2000 Archaeological and Historical Site Investigation/thesis of the John's Island Wreck (EDS0001). Master's thesis, Department of History, East Carolina University, Greenville, NC.

Neilan, David, G. Richard Wise, and Benjamin H. Rubin.
2025 *The Francis Marion Papers*. South Carolina American Revolution Sestercentinnial Commission, Columbia, SC.

Nelson, James L.
2007 *Benedict Arnold's Navy: The Ragtag Fleet That Lost the Battle of Lake Champlain but Won the American Revolution*. McGraw Hill Publishing Company, NY.

New England Restraining Act (15 Geo. 3. c. 10)
1775 An Act to Restrain the Trade and Commerce of the Provinces of Massachuset's Bay and New Hampshire, and Colonies of Connecticut and Rhode Island, and Providence Plantation, in North America, to Great Britain, Ireland, and the British Islands in the West Indies; and to Prohibit Such Provinces and Colonies from Carrying on Any Fishery on the Banks of Newfoundland, or Other Places Therein Mentioned, Under Certain Conditions and Limitations 14th Parliament of Great Britain, British National Archives at Kew, London, UK.

Newsom, Lee
1994 Wood Sample Report. Southern Illinois University at Carbondale.

National Oceanic and Atmospheric Administration (NOAA)
2024 *Eighteenth Century Virginia Hurricanes*. National Oceanic and Atmospheric Administration, Washington, DC <https://www.wpc.ncep.noaa.gov/research/roth/va18hur.html>. Accessed 10 March 2025.

North Carolina Department of Administration (NCDOA)
2025 *NC Tribal Communities*. North Carolina Department of Administration, Raleigh, NC <https://www.doa.nc.gov/divisions/american-indian-affairs/tribes>. Accessed 16 January 2025.

North Carolina General Assembly (NCGA)
1771 *Acts of the North Carolina General Assembly, December 05, 1770-January 26, 1771*. Colonial Records of North Carolina 23(1):787-849. University of North Carolina at Chapel Hill.

North Carolina Office of State Archaeology (NCOSA)
2024 *Colonial Port Records 1700–1800*. State Archives of North Carolina. North Carolina Department of Natural and Cultural Resources, Raleigh, NC <https://archaeology.ncdcr.gov/underwater-archaeology-branch/public-education-and-research/port-records-1700-1800>. Accessed 17 February 2024.

North Carolina Senate (NCS)
1780 06 September 1780. General Assembly Session Records. *Senate Joint Resolutions: August 30–September 13*. State Archives of North Carolina, Raleigh, NC <https://digital.ncdcr.gov/Documents/Detail/senate-joint-resolutions-august-30-september-13/705718?item=705787>. Accessed 30 October 2025.

North Carolina State Archives (NCSA)
1777 List of Justices of the Peace Swearing the Oath of Allegiance to the State of North Carolina, circa 1777. *Chowan County Papers XVI (1777–1779)*, North Carolina Department of Natural and Cultural Resources, Raleigh, NC.

Parramore, Thomas
1967 *Cradle of the Colony: The history of Chowan County and Edenton, NC*. Edenton Chamber of Commerce, Edenton, NC.

Parker, John Crump
1975 Old South Quay in Southampton County: Its Location, Early Ownership, and History. *The Virginia Magazine of History and Biography* 83 (2):160–72.

Passaro, Chuck
2009 *Modeling the US Brig Siren 1803: Chapters 01–20*. Model Expo <https://modelexpo-online.com/assets/images/documents/MS2260-Syren-Instructions-Chapter-01.pdf>. Accessed 27 May 2024.

Pearce, Israel
1832 Pension Application of Israel Pearce. Transcribed by Leon C. Harris. Southern Campaigns: American Revolution Pension Statements & Rosters, Online Database <https://revwarapps.org/s3660.pdf>. Accessed 30 October 2025.

Pecorelli, Harry, III
2003 Archaeological Investigation of the B&B Wreck (38BK1672): An Eighteenth-Century Plantation-Built Vessel, Charleston, South Carolina**.** Master's thesis, Department of History, East Carolina University, Greenville, NC.

Phillips, Carla Rahn
1986 *Six Galleons for the King of Spain: Imperial Defense in the Early Seventeenth Century*. Johns Hopkins University Press, Baltimore, MD.

Powell, William
1958 Ye Countie of Albemarle in Carolina, a Collection of Documents, 1664-1675. North Carolian Department of Natural and Cultural Resources, Raleigh, NC <https://babel.hathitrust.org/cgi/pt?id=uva.x000605980&seq=9>. Accessed 17 February 2024.

Preston, David L.
1996 The Royal Navy Lost the Revolution: The British Failure to Contain the French Fleet in European Waters Resulted in a Worldwide Struggle for Supremacy that Spread to Gibraltar, India, and the West Indies, and Ultimately Cost Britain the 13 Colonies. *Naval History Magazine* 10(1).

Pryor, John H.
1995 From Dromon to Galea: Mediterranean Bireme Galleys AD 500-1300. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp. 101-116. Conway Maritime Press, London, UK.

Purcell, William
1792 Mr. Purcell, Carpenter of the *Bounty*, Called in and Sworn. *Mutiny on the Bounty Court-Martial Transcript*. The National Archives, Kew, UK.

Rankhorn, Joseph
1833 Pension Application of Joseph Rankhorn. Transcribed by Will Graves. Southern Campaigns: American Revolution Pension Statements & Rosters, Library of Virginia, Richmond <https://revwarapps.org/s1712.pdf>. Accessed 30 October 2025.

Rankov, Boris
1995 Fleets of the Early Roman Empire, 31 BCE - AD 324. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp.78-85. Conway Maritime Press, London, UK.

Raupp, Jason T., Jennifer McKinnon, Jeremy Borrelli, Addison Costa, Thomas Fosdick, Alex Morrow, Jim Fowler, Armani Gibbs, Evan Olinger, Dorian Record, Don Swanbeck, Ian Shoemaker, Cory Van Hees, and Nate Wood
2025 ECU Program in Maritime Studies Summer Field School (**HIST5530**), 2024 Report of Investigations: Edenton Harbor, Edenton, NC. Report Submitted to North Carolina Office of State Archaeology, Underwater Archaeology Branch, Kure Beach, NC.

Riggs, Stanley R., Dorothea V. Ames, Stephen J. Culver, and David J. Mallinson
2011 *The Battle for North Carolina's Coast: Evolutionary History, Present Crisis, & Vision for the Future*. The University of North Carolina Press, Chapel Hill.

Rind, Clementina (publisher)
1774 *Edenton, North Carolina, October 25, 1774. The Virginia Gazette*, Williamsburg, VA <https://www.ncpedia.org/media/image/edenton-north-carolina>. Accessed 22 February 2024.

Robinson, David S.
2018 *Marine Archaeological Investigation: Removal and Documentation of the New Bedform Harbor Superfund Site Unanticipated Discovery Shipwreck #2 from the 2015 Task 2 (Submarine Cable Crossing) Study Area*. CR Environmental, Inc., East Falmouth, MA <https://semspub.epa.gov/work/01/100010798.pdf>. Accessed 2 May 2024.

Rodgers, Bradly A. and A. Corbin
2002 Shipwreck in a Swamp: The Burroughs Site at Edenton, N. Carolina, USA. *International Journal of Nautical Archaeology* 31(1):228-236.

Royal Museums Greenwich (RMG)
1676 Lines Plan for *Charles Galley*. Technical Drawing No. HIS0097, Ship Plans Collection, National Maritime Museum, Greenwich, London, UK <https://www.rmg.co.uk/collections/objects/rmgc-object-461090>. Accessed 3 June 2024.

Royal Museums Greenwich (RMG).
2024 How Long Did It Take? <https://www.rmg.co.uk/stories/blog/library-archive/18th-century-sailing-times-between-english-channel-coast-america-how>. Accessed 21 February 2024.

Royal Museums Greenwich (RMG).
2025 *The Battle of Lepanto, 7 October 1571*. National Maritime Museum, Greenwich, London, UK <https://www.rmg.co.uk/collections/objects/rmgc-object-11753>. Accessed 3 February 2025.

Roth, David, and Hugh Cobb
2001 Eighteenth century Virginia hurricanes. National Weather Service and National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Silver Spring, MD <https://www.wpc.ncep.noaa.gov/research/roth/va18hur.htm>. Accessed 20 April 2024.

Saberton, Ian
2010 *The Cornwallis Papers: The Campaigns of 1780 and 1781 in The Southern Theatre of the American Revolution, Vol. 1*. The Naval & Military Press, Uckfield, East Sussex, UK.

Sabick, Chris
2004 His Majesty's Hired Transport Schooner *Nancy.* Master's thesis, Department of Anthropology, Texas A&M University, College Station.

Sabick, Chris
2024 Row Galley *Congress* Scantlings. Field Notes. Lake Champlain Maritime Museum. Ferrisburgh, VT.

Salley, A. S. 1871-1981, South Carolina Archives Department
1912 *Journal of the Commissioners of the Navy of South Carolina October 9, 1776-March 1, 1779, July 22, 1779-March 23, 1780*. Commissioners of the Navy Board, Historical Commission of South Carolina, Columbia.

Salley, A. S. 1871-1981, South Carolina Archives Department
1913 *Journal of the Commissioners of the Navy of South Carolina October 9, 1776-March 1, 1779, July 22, 1779-March 23, 1780*. Commissioners of the Navy Board, Historical Commission of South Carolina, Columbia.

Salisbury, Neal
1996 Native People and European Settlers in Eastern North America, 1600–1783. In *The Cambridge History of the Native Peoples of the Americas*, *Vol. 1: North America*. Bruce G. Trigger and Wilcomb E. Washburn, editors, pp. 399–460. Cambridge University Press, Cambridge, UK.

Salisbury, Neal
1985 The Colonizing of Indian New England. *The Massachusetts Review* 26 (2/3):447–460.

Sanchez-Saavedra, E. M.
1978 *A Guide to Virginia Military Organizations in the American Revolution, 1774-1787*. Heritage Books Inc., Westminster, MD.

Scott, John C.
2018 The Phoenicians and the Formation of the Western World. *Comparative Civilizations Review* 78(78): 25–40.
Seelinger, Matthew
2022 Buying Time: The Battle of Valcour Island. The Army Historical Foundation <https://armyhistory.org/buying-time-the-battle-of-valcour-island/>. Accessed 6 January 2025.

Shepherd, James F., and Samuel Williamson
1972 The Coastal Trade of the British North American Colonies, 1768–1772. *The Journal of Economic History* 32(4): 783–810.

Short, Dennis
1977 *The Toano Report*. Virginia Research Center for Archaeology, Williamsburg, VA.

Smith, William
1854 L. liburni-geo in *Dictionary of Greek and Roman Geography*. Walton & Maberly, London, UK <https://www.perseus.tufts.edu/hopper/text?doc=L.liburni-geo&fromdoc=Perseus%3Atext%3A1999.04.0064>. Accessed 3 January 2025.

Snow, Elliot
1936 The Row Galley *Bulldog*. *Proceedings of the U.S. Naval Institute* 62(7):401.

Stamp Act (5 Geo. 3. c. 12)
1765 *Duties in American Colonies Act*. 12th Parliament of Great Britain. British National Archives at Kew, London, UK.

State Archives of North Carolina (SANC)
1777 List of Justices of the Peace Swearing the Oath of Allegiance to the State of North Carolina, circa 1777. *Chowan County Papers* 1777-1779 16(1). North Carolina Department of Natural and Cultural Resources. Historical Research and Publications Office, Raleigh, NC.

Steffy, Richard J.
1994 *Wooden Ship Building and the Interpretation of Shipwrecks*. Texas A&M University Press, College Station.

Steel, David
1794 *The Elements and Practice of Rigging and Seaman-ship, Illustrated with Engravings in Two Volumes*. Little Tower Hill, London, UK.

Steel, David
1805 *The Shipwrights Vademecum*. Navigation-Warehouse, Little Tower Hill, London, UK.

Stephenson, Orlando W.
1925 The Supply of Gunpowder in 1776. *The American Historical Review* 30 (2):271–81.

Stevens, William O., and Allan F. Westcott
1920 *A History of Sea Power.* George H. Doran Company, New York, NY.

Stick, David and John Hairr
2006 Ports and Harbors. *NC Pedia,* Government & Heritage Library, Raleigh, NC <https://www.ncpedia.org/ports-and-harbors>. Accessed 1 February 2024.

Stroud, Michael
2002 A 16th Century Iron Breech-Loading Swivel-Gun. *Malta Archaeological Review* 6 (1):22-25.

Sugar Act (4 Geo. 3. c. 15)
1764 *American Revenue Act*. 12th Parliament of Great Britain, British National Archives at Kew, London, UK.

Sumner, Perry, Mike Carraway, and John Williams
2018 *River Otter: North Carolina Wildlife Profiles*. North Carolina Wildlife Resources Commission <https://www.ncwildlife.gov/media/2210/open>. Accessed 24 August 2024.

Swedish National Maritime Museum (SNMM).
1715 Contemporary Model of a Swedish Galley of 1715 by Axel Lewenhaupt. Maritime Museum of Stockholm, Sweden <https://commons.wikimedia.org/wiki/File:Swedish_galley-(1715)-1.jpg>. Accessed 20 March 2025.

Switzer, David C.
1983 The Excavation of the Privateer *Defence*. *Northeast Historical Archaeology* 12(12):43-50.

Tea Act (13 Geo. 3. c. 44)
1773 An Act To Allow a Drawback of the Duties of Customs on the Exportation of Tea to Any of His Majesty's Colonies or Plantations in America; To Increase the Deposit on Bohea Tea to be Sold at the India Company's Sales; and to Impower the Commissioners of the Treasury to Grant Licenses to the East India Company to Export Tea Dury-Free 13th Parliament of Great Britain, British National Archives at Kew, UK.

Thompson, John R.
1857 The Virginia Navy of the Revolution Part 1. *The Southern Literary Messenger* 24(1):1-20

Townshend Act (7 Geo. 3. c. 41)
1767 An Act to Enable His Majesty to put the Customs, and Other Duties, in the British Dominions in America, and the Execution of the Laws Relating to Trade There, Under the Management of Commissioners to be Appointed for that Purpose, and to be Resident in the said Dominions. 12th Parliament of Great Britain, Townshend Acts, British National Archives at Kew, UK.

Townshend Act (7 Geo. 3. c. 56)
1767 An Act for Granting Certain Duties in the British Colonies and Plantations in America, and for Further Securing the Duties on Tea, and for Preventing the Fraudulent Drawback Thereof. 12th Parliament of Great Britain, Townshend Acts, British National Archives at Kew, UK.

Townshend Act (7 Geo. 3. c. 46)
1767 An Act for Granting Certain Duties in the British Colonies and Plantations in America. 12th Parliament of Great Britain, Townshend Acts, British National Archives at Kew, UK.

Twede, Diane
2005 The Cask Age: The Technology and History of Wooden Barrels. *Packaging Technology and Science* 18(5):253-264.

Underhill, Harold A.
1972 *Masting and Rigging the Clipper Ship and Ocean Carrier*. Brown, Son and Ferguson. Nautical Publishers, Glasgow, Scotland.

Vanhorn, Kellie M.
2004 Eighteenth-Century Colonial American Merchant Ship Construction. Master's thesis, Department of Anthropology, Texas A&M University, College Station.

Ventris, Michael and John Chadwick
1973 *Documents in Mycenaean Greek*. Syndics, Cambridge University Press, London, UK.

Ward, H. Trawick and Stephen Davis Jr.
1999 *Time Before History: The Archaeology of North Carolina.* The University of North Carolina Press, Chaple Hill.

Watts, Gordon P., Jr.
1981 The Edenton Harbor Wrecks: Underwater Archaeology in America. *Archaeology* 34(1):14–21.

Watts Gordon P., Jr. and Michael Cameron Krivor
1995 Investigation of an 18th-century English Shipwreck in Bermuda. *The International Journal of Nautical Archaeology* 24(2):97-108.

Watts, Gordon P., Jr and Richard Lawrence
1980 *Magnetic Survey of Edenton Harbor*. North Carolina Division of Archives and History, Raleigh, NC.

Wachsmann, Shelley
1995 Paddle and Oared Ships Before the Iron Age. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp. 10-34. Conway Maritime Press, London, UK.

Walbert, David
2006 Naval Stores and the Longleaf Pine. Anchor: A NC History Online Resource <https://www.ncpedia.org/anchor/naval-stores-and-longleaf>. Accessed 17 February 2024.

Wallinga, H. T.
1995 The Ancestry of the Trireme 1200 BCE - 525 BCE. In *The Age of the Galley: Mediterranean Oared Vessels Since Pre-Classical Times*, Robert Gardiner, editor, pp. 36-48. Conway Maritime Press, London, UK.

Walton, Gary M.
1968 A Measure of Productivity Change in American Colonial Shipping. *The Economic History Review* 21(2): 268–82.

Westphalen, N.
2016 Roman Warfare, Ships and Medicine. *Journal of Military Veteran Health* (28)3:11-22.

Wiggins, Jasper, L.
1954 The Guns of *The Holy Heart of Jesus*. *The State: Down Home in North Carolina* 32(15c):7.

Wiggins, Jasper, L.
1949 Historic Chowan. *The State: Down Home in North Carolina* 16(41):6-7.

Wiggins, Jasper, L.
1944 Historic cannon. *The State: Down Home in North Carolina* 11(50):5.

Whiting, Thomas

1777 Rigging for the Gloucester Galley. *American Theatre from March 1, 1777, to April 30, 1777*. 8(1):487. Housed at the Outer Banks History Center, Manteo, NC.

Wilcox, William B.
1986 *Papers of Benjamin Franklin, Vol. 25*. Yale University Press, New Haven, CT and London, UK.

Williams, Justin
1935 English Mercantilism and Carolina Naval Stores, 1705-1776. *The Journal of Southern History* 1(2):169-185.

Wilson, Willis
1843 Pension Application of Willis Wilson. Transcribed by Will Graves, Southern Campaigns American Revolution Pension Statements & Rosters <https://www.revwarapps.org/r109.pdf>. Accessed 30 October 2025.

Wukovits, John F.
1944 *The Manhattan Project*. Greenhaven Publishing, New York, NY.

Yellin, Jean Fagan
2004 *Harriet Jacobs: A Life*. Basic Civitas Books, New York, NY.

APPENDIX A

Artifacts Recovered from the John's Island Wreck in 1980 (Adapted from Watts 1981:39)

Artifact 400 – Barrel Stave
Dimensions: 24 in (60 cm) long, 2.5 in (6.3 cm) wide, 0.25 in (0.6 cm) thick

Artifact 401 – Handmade Brick
Dimensions: 8.25 in (21 cm) long, 3.75 in (9 cm) wide, 0.25 in (0.6 cm) thick

Artifact 402 – Bent Spike, hammered on two sides
Dimensions: 3.75 in (9.5 cm) long

Artifact 403 – Ballast Rock, chipped
Dimensions: 4 in (10.2 cm) diameter

Artifact 404 – Iron Pin
Dimensions: 29.25 in (74.3 cm) long

Artifact 405 – Rose Head Spike, hammered on four sides
Dimensions: 5.375 in (13.65 cm) long

Artifact 406 – Block and Tackle with wood and iron parts
Dimensions: 16 in (40.6 cm) long

Artifact 413 – Brain Coral
Dimensions: Not available

Artifact 414 – Base of case of gin bottles
Dimensions: Not available

Artifact 415 – Wood Fragment
Dimensions: 6 in (15.2 cm) long, 0.75 in (1.9 cm) wide

Artifact 416 – Spike
Dimensions: 5.25 in (13.3 cm) long, 0.25 in (0.6 cm) wide

Artifact 417 – Wood Fragment
Dimensions: 10.5 in (26.7 cm) long, 2 in (5.1 cm) wide

Artifact 418 – Spike Fragment
Dimensions: 3.5 in (8.9 cm) long

Artifact 419 – Charred Wood Fragment
Dimensions: 5.25 in (13.3 cm) long, 2.25 in (5.7 cm) wide

Artifact 420 – Ferrous metal strip with circular hole at one end
Dimensions: 16 in (40.6 cm) long, 0.5 in (1.3 cm) wide

Artifact 421 – Iron Spike
Dimensions: 19.5 in (49.5 cm) long, 0.75 in (1.9 cm) diameter

Artifact 422 – Wood Fragment
Dimensions: 12 in (30.5 cm) long, 2.5 in (6.4 cm) at widest point

Artifact 423 – Wood Fragment with remains of nail
Dimensions: 5 in (12.7 cm) long, 2 in (5.1 cm) wide

Artifact 424 – Barrel Stave
Dimensions: 25.5 in (64.8 cm) long, 3.75 in (9.5 cm) wide

Artifact 425 – Wood Planking, notched on one end
Dimensions: 22 in (55.9 cm) long, 5.75 in (14.6 cm) wide

Artifact 426 – Rounded Wooden Peg
Dimensions: 5 in (12.7 cm) long, 1.25 in (3.2 cm) wide

Artifact 427 – Spike
Dimensions: 5.25 in (13.3 cm) long, 0.5 in (1.3 cm) wide

Artifact 428 – Spike, badly deteriorated
Dimensions: 5.25 in (13.3 cm) long

Artifact 429 – Spike, badly deteriorated
Dimensions: 4.25 in (10.8 cm) long

Artifact 430 – Spike
Dimensions: 6.5 in (16.5 cm) long, 0.5 in (1.3 cm) wide

Artifact 431 – Charred Wood Fragment
Dimensions: Not available

Artifact 432 – Wood Fragment, notched on one end
Dimensions: 1 in (2.5 cm) long, 0.5 in (1.3 cm) wide

Artifact 433 – Wood Fragment with saw marks on one side
Dimensions: 6 in (15.2 cm) long, 0.5 in (1.3 cm) wide

Artifact 434 – Charred Wood Fragment
Dimensions: 3 in (7.6 cm) long, 1 in (2.5 cm) wide

Artifact 435 – Solid Shot
Dimensions: Approximately 24 lb

Artifact 436 – Solid Shot
Dimensions: Approximately 24 lb

Artifact 437 – Spike Fragment
Dimensions: 1.75 in (4.4 cm) long

Artifact 438 – Wood fragment with remains of a nail
Dimensions: 4.5 in (11.4 cm) long, 2.5 in (6.4 cm) wide

Artifact 439 – Exterior hull planking samples
Dimensions: Not available

Artifact 440 – Curved ferrous metal object with holes at each end
Dimensions: Not available

Artifact 441 – Shoe Leather
Dimensions: Not available

Artifact 442 – Dark green bottle glass fragments
Dimensions: Not available

APPENDIX B

Scantling Measurements from the John's Island Wreck (1993) (Adapted from Neidinger 2000:53–70)

Stem

Dimensions (Imperial): 2.5 ft long x 7–8 in wide
Dimensions (Metric): 76.2 cm long x 17.78–20.32 cm wide

False Keel (attached to bottom of keel)

Dimensions (Imperial): 4 in sided x 5 in molded
Dimensions (Metric): 10.16 cm sided x 12.7 cm molded

Apron (Bow Area)

Dimensions (Imperial): 8 in sided x 8 in molded
Dimensions (Metric): 20.32 cm sided x 20.32 cm molded

Between Stem Post and Keelson (Forward)

Dimensions (Imperial): 11 in
Dimensions (Metric): 27.94 cm

Radial Cant Frame #1 (forward most, pulled away from centerline)

Dimensions (Imperial): 7 in sided x 8 in molded
Dimensions (Metric): 17.78 cm sided x 20.32 cm molded

Radial Cant Frame #2

Dimensions (Imperial): 7 in sided x 6 in molded
Dimensions (Metric): 17.78 cm sided x 15.24 cm molded

Mizzenmast Step

Dimensions (Imperial): 16.24 in long, 4 in wide, 4.5 in molded
Dimensions (Metric): 41.24 cm long, 10.16 cm wide, 11.43 cm deep

Saddle Block Mast Step

Dimensions (Imperial): 16 in sided x 2 ft 1.5 in molded; 4 ft 2.5 in long (centered across keelson)
Dimensions (Metric): 40.64 cm sided x 64.77 cm molded; 128.27 cm long

Mortise

Dimensions (Imperial): 12 in wide x 18 in long

Dimensions (Metric): 30.48 cm wide x 45.72 cm long

Stanchion Mortise (aft of saddle block, 20 ft mark)

Dimensions (Imperial): 9 in long x 6 in wide
Dimensions (Metric): 22.86 cm long x 15.24 cm wide

Mainmast Step (cut into keelson at 58 ft 10 in mark)

Dimensions (Imperial): 12 in long, 9.5 in wide, 13 in molded
Dimensions (Metric): 30.48 cm long, 24.13 cm wide, 33.02 cm deep

Bow Section Floors (5 mapped)

Dimensions (Imperial): Typically 6 in sided x 6 in molded (one 7 in x 6 in); spacing approx. 5 in
Dimensions (Metric): Typically 15.24 cm x 15.24 cm (one 17.78 cm x 15.24 cm); spacing approx. 12.7 cm

Floor 1 (Midship)

Dimensions (Imperial): 7.5 in wide x 9 in molded
Dimensions (Metric): 19.05 cm wide x 22.86 cm molded

Floor 2 (Midship)

Dimensions (Imperial): 7 in sided x 9 in molded
Dimensions (Metric): 17.78 cm x 22.86 cm molded

Space Between Floors (Midship)

Dimensions (Imperial): 16 in
Dimensions (Metric): 40.64 cm

Stern Section Floors (2 mapped)

Dimensions (Imperial): Average 5 in sided x 5 in molded
Dimensions (Metric): Average 12.7 cm x 12.7 cm

Space Between Floors (Stern)

Dimensions (Imperial): Decreases from 5.5 in to 4 in to 3 in
Dimensions (Metric): Decreases from 13.97 cm to 10.16 cm to 7.62 cm

Bow Keelson

Dimensions (Imperial): 9 in sided x 10 in molded
Dimensions (Metric): 22.86 cm x 25.4 cm molded

Rider Keelson

Dimensions (Imperial): 8.5 in sided x 10.5 in molded (forward), 11.5 in molded (aft)
Dimensions (Metric): 21.59 cm x 26.67 cm (forward), 29.21 cm molded (aft)

Keelson (37 ft 2 in to 69 ft mark)

Dimensions (Imperial): 11.5 in sided x 13 in molded
Dimensions (Metric): 29.21 cm x 33.02 cm molded

Keelson (69 ft to 78 ft 6 in mark)

Dimensions (Imperial): Narrows from 11.5 in to 9.5 in
Dimensions (Metric): Narrows from 29.21 cm to 24.13 cm

Keelson End (103 ft 6 in mark)

Dimensions (Imperial): 10 in sided x 6 in molded
Dimensions (Metric): 25.4 cm x 15.24 cm molded

Estimated Overall Keel Length

Dimensions (Imperial): 95–100 ft
Dimensions (Metric): 28.96–30.48 m

Bow Futtock

Dimensions (Imperial): 6 in sided x 6 in molded
Dimensions (Metric): 15.24 cm x 15.24 cm

Midship Futtock

Dimensions (Imperial): 7.5 in sided x 9 in molded
Dimensions (Metric): 19.05 cm x 22.86 cm

Midship Futtock Toes

Dimensions (Imperial): Begin approx. 5 in from keelson edge
Dimensions (Metric): Begin approx. 12.7 cm from keelson edge

Stern Futtock

Dimensions (Imperial): 5.5 in sided x 5 in molded
Dimensions (Metric): 13.97 cm x 12.7 cm

Ceiling Planks

Dimensions (Imperial): 7–12 in wide, 1.25–1.5 in thick, at least 12 ft long
Dimensions (Metric): 17.78–30.48 cm wide, 3.18–3.81 cm thick, at least 365.76 cm long

Outer Planking

Dimensions (Imperial): 4.5–10.5 in wide, 1–1.5 in thick
Dimensions (Metric): 11.43–26.67 cm wide, 2.54–3.81 cm thick

Inner Post (forward of stern post)

Dimensions (Imperial): 3 ft 6 in sided, 12 in wide, 5 in molded
Dimensions (Metric): 106.68 cm sided, 30.48 cm wide, 12.7 cm molded

Sternpost (extant section)

Dimensions (Imperial): 3 ft 3 in sided
Dimensions (Metric): 99.06 cm sided

Sternpost Top

Dimensions (Imperial): 7 in wide x 3 in molded
Dimensions (Metric): 17.78 cm x 7.62 cm molded

Sternpost Width at Keel

Dimensions (Imperial): 15 in wide x 5 in molded
Dimensions (Metric): 38.1 cm x 12.7 cm molded

Iron Straps (sternpost to keel, 2 total)

Dimensions (Imperial): 3 in wide x 2 ft 4 in long
Dimensions (Metric): 7.62 cm wide x 71.12 cm long

Gudgeon Strap

Dimensions (Imperial): 5 in wide x 4 ft 4 in long
Dimensions (Metric): 12.7 cm wide x 132.08 cm long

Pintle Hole

Dimensions (Imperial): 1.5 in diameter
Dimensions (Metric): 3.81 cm diameter

Cavity Under Gudgeon (sternpost)

Dimensions (Imperial): 6 in long x 3 in wide x 7 in deep
Dimensions (Metric): 15.24 cm long x 7.62 cm wide x 17.78 cm deep

Fastener Inside Cavity

Dimensions (Imperial): 1.5 in diameter
Dimensions (Metric): 3.81 cm diameter

APPENDIX C.

Wood Samples taken from the John's Island Wreck in 1993 (Neidinger 2000:62-70; Newsom 1994).

Sample A

Location: Ceiling, bow
Wood Type: Pinus species (Diploxylon section, Taeda group, southern hard pine / "yellow pines," e.g., longleaf, slash, loblolly pine)

Sample B

Location: Trunnel, bow
Wood Type: Taeda group pine (same classification as Sample A)

Sample C

Location: Outer planking, bow
Wood Type: Taeda group pine (same classification as Sample A)

Sample D

Location: Floor, bow
Wood Type: Quercus species (white oak group, e.g., American white oak)

Sample E

Location: Keelson, bow
Wood Type: Quercus species (cf. white oak group)

Sample F

Location: 1st futtock, bow
Wood Type: Taeda group pine (same classification as Sample A)

Sample G

Location: 2nd futtock, bow
Wood Type: Taeda group pine (same classification as Sample A)

Sample H

Location: Stem, bow
Wood Type: Quercus species (cf. white oak group)

Sample I

Location: Saddle step, bow
Wood Type: Quercus species (cf. white oak group)

Sample J

Location: Ceiling
Wood Type: Taeda group pine (same classification as Sample A)

Sample K

Location: 1st futtock
Wood Type: Taeda group pine (same classification as Sample A)

Sample L

Location: 2nd futtock
Wood Type: Taeda group pine (same classification as Sample A)

Sample M

Location: Outer hull trunnel
Wood Type: Taeda group pine (same classification as Sample A)

Sample N

Location: Keelson
Wood Type: Quercus species (cf. white oak group)

Sample O

Location: Keel
Wood Type: Quercus species (red oak group)

Sample P

Location: Outer plank
Wood Type: Taeda group pine (same classification as Sample A; fungal hyphae abundant, possible subaerial exposure)

Sample Q

Location: 2nd strake (next to garboard)
Wood Type: Quercus species (white oak group)

Sample R

Location: Floor
Wood Type: Quercus species (white oak group)

Sample S

Location: Futtock, stern
Wood Type: Taeda group pine (same classification as Sample A)

Sample T

Location: Outer plank, stern
Wood Type: Taeda group pine (same classification as Sample A)

Sample U

Location: Keelson, stern
Wood Type: Quercus species (white oak group)

Sample V

Location: Ceiling, stern
Wood Type: Taeda group pine (same classification as Sample A)

Sample W

Location: Floor, stern
Wood Type: Quercus species (white oak group)

Sample X

Location: Stern post, stern
Wood Type: Quercus species (white oak group)

APPENDIX D.

Artifacts recovered from John's Island Wreck in 2024 (Program in Maritime Studies 2024).

Ballast Rock (a)
Baseline Location: 21 m (68 ft)
Baseline Offset: 1 m (3 ft)
Description: Mica-flecked schist not native to eastern North Carolina
Image: 

Ballast Rock (b)
Baseline Location: 21 m (68 ft)
Baseline Offset: 50 cm (19.6 in)
Description: Granite rock; material not native to eastern North Carolina
Image: 

Brick (a)
Baseline Location: 23 m (75 ft)
Baseline Offset: 6 cm (2.3 in)
Description: Red brick
Image: 

Brick (b)
Baseline Location: 23 m (75 ft)
Baseline Offset: 40 cm (15.7 in)
Description: Red brick likely marketable ballast
Image: 

Brick (c)
Baseline Location: 23 m (75 ft)
Baseline Offset: 1.2 m (3.9 ft)
Description: 18th century clinker (Dutch paver) brick
Image: 

Cant Stave (a)
Baseline Location: 4 m (13 ft)
Baseline Offset: 10 cm (3.9 in)
Description: Cant piece from a tight cask
Image: 

Bung Stave (b)
Baseline Location: 9–10 m (30–33 ft)
Baseline Offset: 35 cm (13.7 in)
Description: Cant piece with an intact bung

Image: 

Quarter Head Piece (c)
Baseline Location: 6 m (19 ft)
Baseline Offset: 6 cm (2.3 in)
Description: Middle piece or quarter stave from a tight cask head

Image: 

Drift Pin
Baseline Location: 15 m (49.2 ft)
Baseline Offset: 1 m (3 ft)
Description: Drift pin
Image: 

Mast Cap
Baseline Location: 1–2 m (3–6 ft)
Baseline Offset: 1.2 m (4 ft)
Description: Mast cap with eye. Mast caps were used to secure the top mast element to the main lower part of the mast. Mast caps could also be used to secure the jib to the jibboom on vessels with bowsprits.
Image: 

Charcoal
Baseline Location: 22 m (72 ft)
Baseline Offset: 40 cm (1.3 ft)
Description: Charcoal
Image: 

APPENDIX E.

Timber measurements recorded at the John's Island Wreck in 2024 (Program in Maritime Studies 2024).

Area of Measurement	Measurement (Imperial)	Measurement (Metric)
Rider Keelson at 27.25 m	9.06 in.	23 cm wide
Rider Keelson at 28.7 m	7.8 in.	20 cm wide
Rider Keelson at 26.5 m	8.66 in.	22 cm wide
Saddle Mast Step	16.5 in.	42 cm wide
Portside Frame at 15.3 m	4.7 in. sided, 3.5 in. molded	12 cm sided, 9 cm molded
Portside Frame at 17.3 m	5.5 in. sided, 2.7 in. molded	14 cm sided, 7 cm molded
Portside Frame at 17.8 m	5.5 in. sided, 3.9 in. molded	14 cm sided, 10 cm molded
Portside Frame at 18.3 m	5.9 in. sided, 3.9 in. molded	15 cm sided. 10 cm molded
Portside Frame at 18.9 m	4.7 in. sided, 3.9 in. molded	12 cm sided, 10 cm molded
Portside Frame at 19.2 m	5.1 in. sided, 2.7 in. molded	13 cm sided, 7 cm molded
Portside Frame at 19.4 m	5.9 in. sided, 2.3 in. molded	15 cm sided, 6 cm molded
Portside Frame 19.6 m	5.5 in. sided, 2.7 in. molded	14 cm sided, 7 cm molded

APPENDIX F.

Virginia Navy Board to Captain Charles Thomas, Warwick. Williamsburg Oct. 25th, 1776 (NHHC6 1972:1418).

1 Cable 120 Fathom	12 Inches
1 do ..... do	11 do
1 do ..... do	9 do
175 Fathom	7 Inch Rope
45 ... do	5½ do
400 .. do	5 do
50 ... do	4 do
455 .. do	3½ do
1100 . do	2 do
675 .. do	2¾ do
6 Coils nine Thread Ratlin	
4 do inch & half Cordage	
3 do worming —	